FINAL DECISION DOCUMENT FOR THE INTERIM RESPONSE ACTION AT THE ROCKY MOUNTAIN ARSENAL HYDRAZINE BLENDING AND STORAGE FACILITY

October 1988

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13. ABSTRACT *(Maximum 200 words)*

THIS INTERIM RESPONSE ACTION WILL CONSIST OF 1) THE TREATMENT AND DISPOSAL OF WASTE PRODUCTS AND 2) DISPOSAL OF ALL STRUCTURES ASSOCIATED WITH THE HYDRAZINE BLENDING AND STORAGE FACILITY.

THIS FINAL DECISION DOCUMENT PROVIDES SUMMARIES OF:

1. ALTERNATIVES CONSIDERED
2. SIGNIFICANT EVENTS LEADING TO THE INITIATION OF THE IRA
3. THE IRA PROJECT
4. THE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS, STANDARDS, CRITERIA, AND LIMITATIONS (ARAR'S) ASSOCIATED WITH THE PROGRAM.

EITHER OZONE/UV OR HYDROGEN PEROXIDE/UV IS RECOMMENDED FOR TREATMENT OF WASTEWATER.

COMMENTS AND RESPONSES ARE FOUND IN THE APPENDIX.

14. SUBJECT TERMS

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

DRAFT FINAL PROPOSED DECISION DOCUMENT FOR THE INTERIM RESPONSE ACTION AT THE ROCKY MOUNTAIN ARSENAL HYDRAZINE BLENDING AND STORAGE FACILITY

1.0 INTRODUCTION

The Interim Response Action (IRA) at the Rocky Mountain Arsenal (RMA) Hydrazine Blending and Storage Facility (HBSF) is being conducted as part of the IRA process for RMA in accordance with the June 5, 1987 report to the court in United States V. Shell Oil Co. and the proposed Consent Decree.

This IRA project will consist of the treatment and disposal of pretreated liquids in tanks used for storage of waste products from the blending of rocket fuels; and the dismantlement and disposal of all remaining above ground structures associated with the HBSF.

2.0 HISTORY OF RMA HBSF

Rocky Mountain Arsenal occupies over 17,000 acres, approximately 27 square miles, of land in Adams County, directly northeast of metropolitan Denver, Colorado (see Figure 1). The HBSF, which is owned by the Air Force and was operated by RMA between 1962 and May 5, 1982 (Strang, 1982), is located east of the South Plants area in the northeast corner of Section 1 (see Figure 2). The site consists of two yards each completely surrounded by a chain-link security fence and a barbed-wire fence. The yards are connected by two overhead pipelines.

The west yard was constructed in 1961 and is approximately 346,000 square feet (ft^2) in area. The yard contains the loading and unloading facilities for rail cars and tank trucks; the blending facilities; a 44,000-gallon inground concrete tank for the collection of wastewaters and area runoff; a drum filling station; a drum storage pad; office, storage, and tool sheds; and two 19,000-gallon carbon steel and four 24,900-gallon stainless steel bulk storage tanks.

The east yard was constructed in 1976 as an additional storage facility for unsymmetrical dimethylhydrazine (UDMH). The east yard is approximately 103,000 ft^2 in area and contains one 50,000- and one 200,000-gallon carbon steel storage tank.

Figure 3 illustrates the schematic layout of the HBSF. Table 1 lists the major equipment and structures located at the HBSF. In addition, the HBSF contains asbestos and polyurethane insulated piping, electrical equipment that may contain polychlorinated biphenyls (PCBs), and flammable liquids including ethylene glycol that was used as a heat transfer fluid in the storage tank heat exchanger units.

The HBSF has been used as a depot to receive, blend, store and distribute hydrazine fuels. The primary operation was the blending of anhydrous hydrazine and UDMH to produce Aerozine 50. The materials were manufactured elsewhere and shipped to RMA for blending. Blending operations were not continuous and occurred in response to requests by the Air Force. Other operations at the HBSF included loading and unloading rail cars and tank trucks; destruction of off-spec batches of Aerozine 50; and storage of Aerozine 50, anhydrous hydrazine, monomethyl hydrazine (MMH), monopropellent hydrazine, hydrazine 70, UDMH, and hydrazine.

Hydrazine and UDMH are ignitable, corrosive and toxic. They are unstable in the natural environment and rapidly decompose when exposed to the atmosphere. One of the decomposition products is n-nitrosodimethylamine (NDMA), a suspected carcinogen. From January through March 1982, OSHA surveyed the HBSF and detected the presence of airborne NDMA within the HBSF. In May 1982, RMA ceased operations and closed the HBSF to all but safety-essential or emergency-response entries.

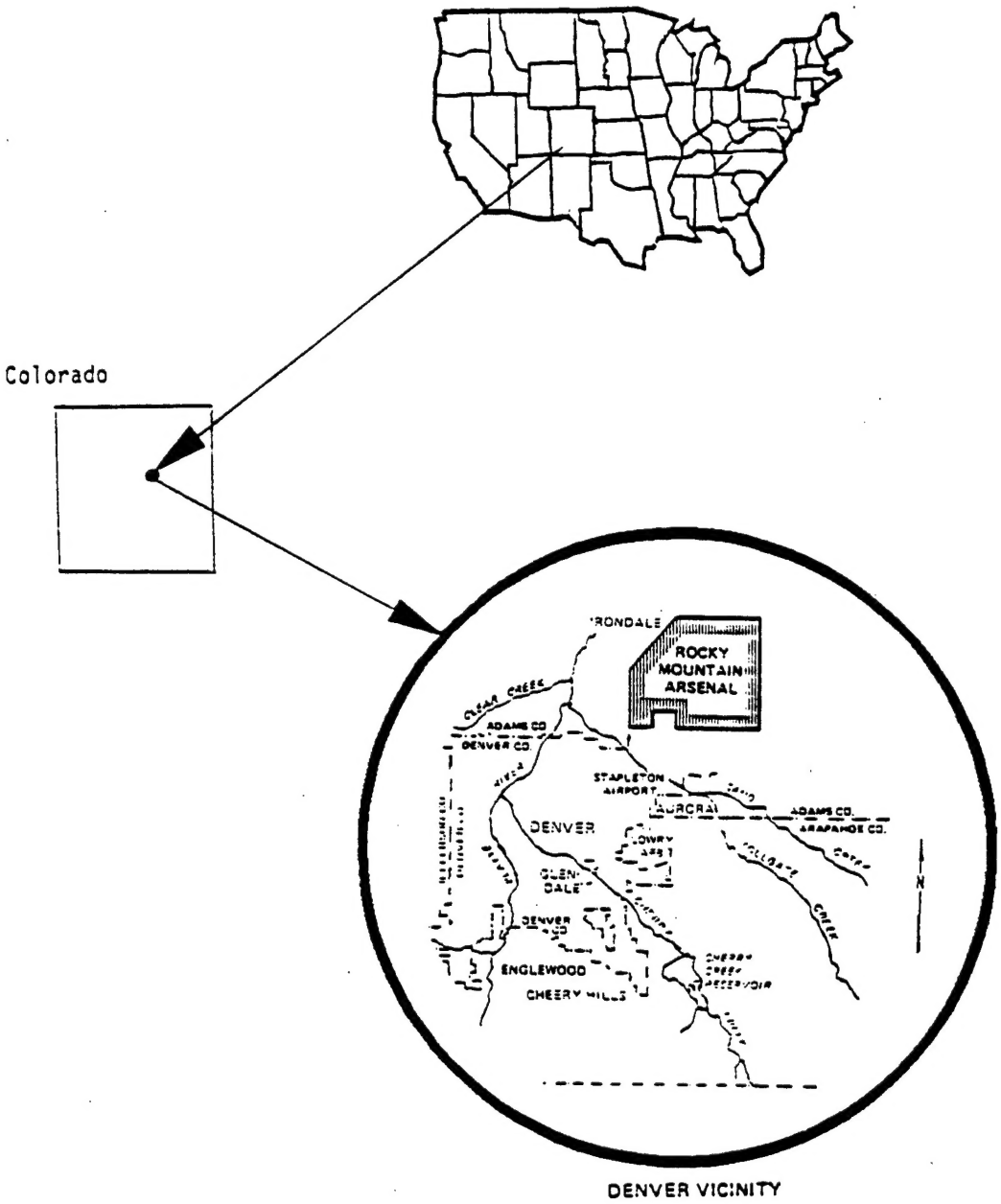

Figure 1. Installation Location Map

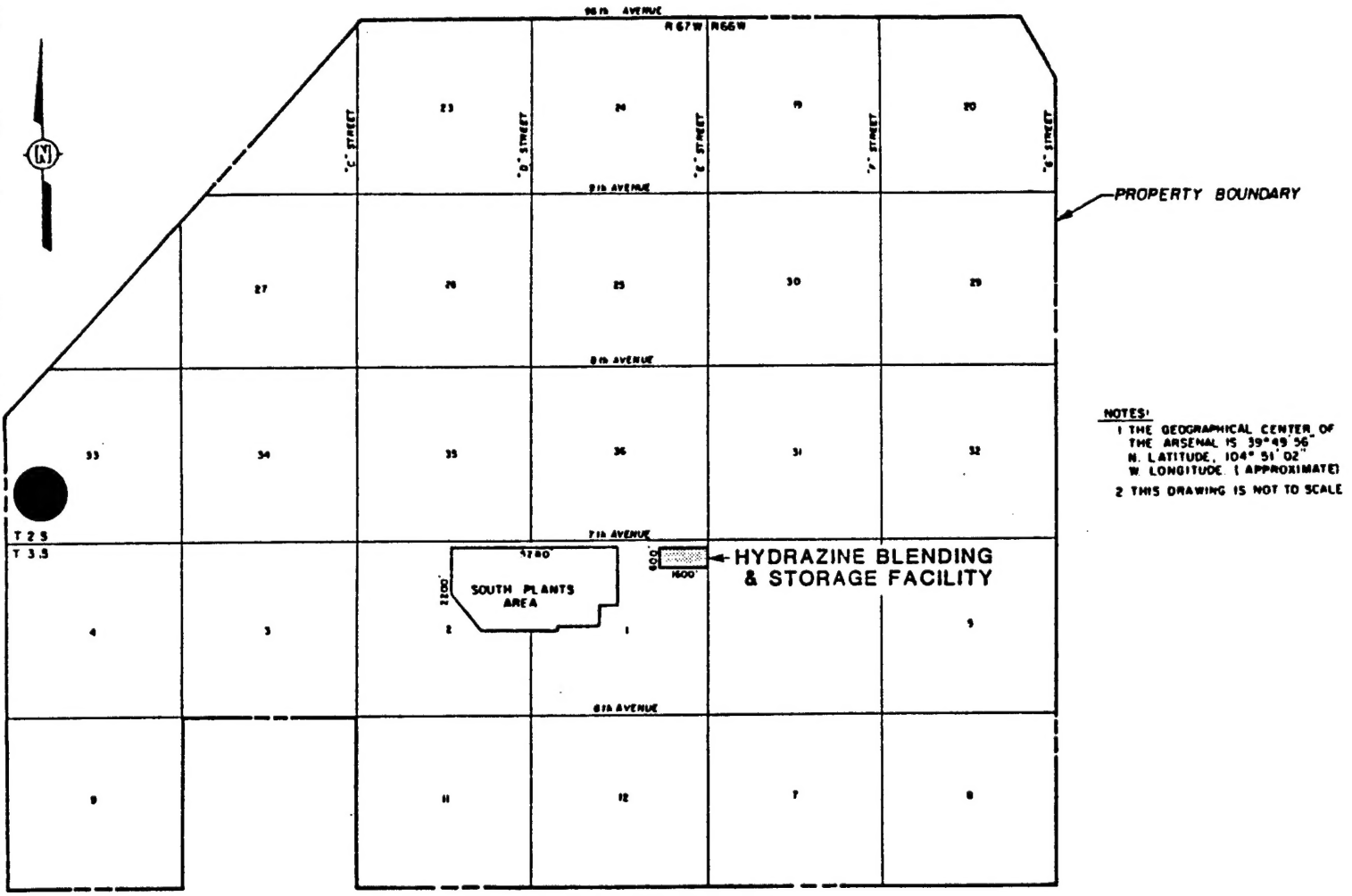

Figure 2. HBSF Location Map

Source: Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, Version 3.1, Ebasco Services Incorporated, June 1988.

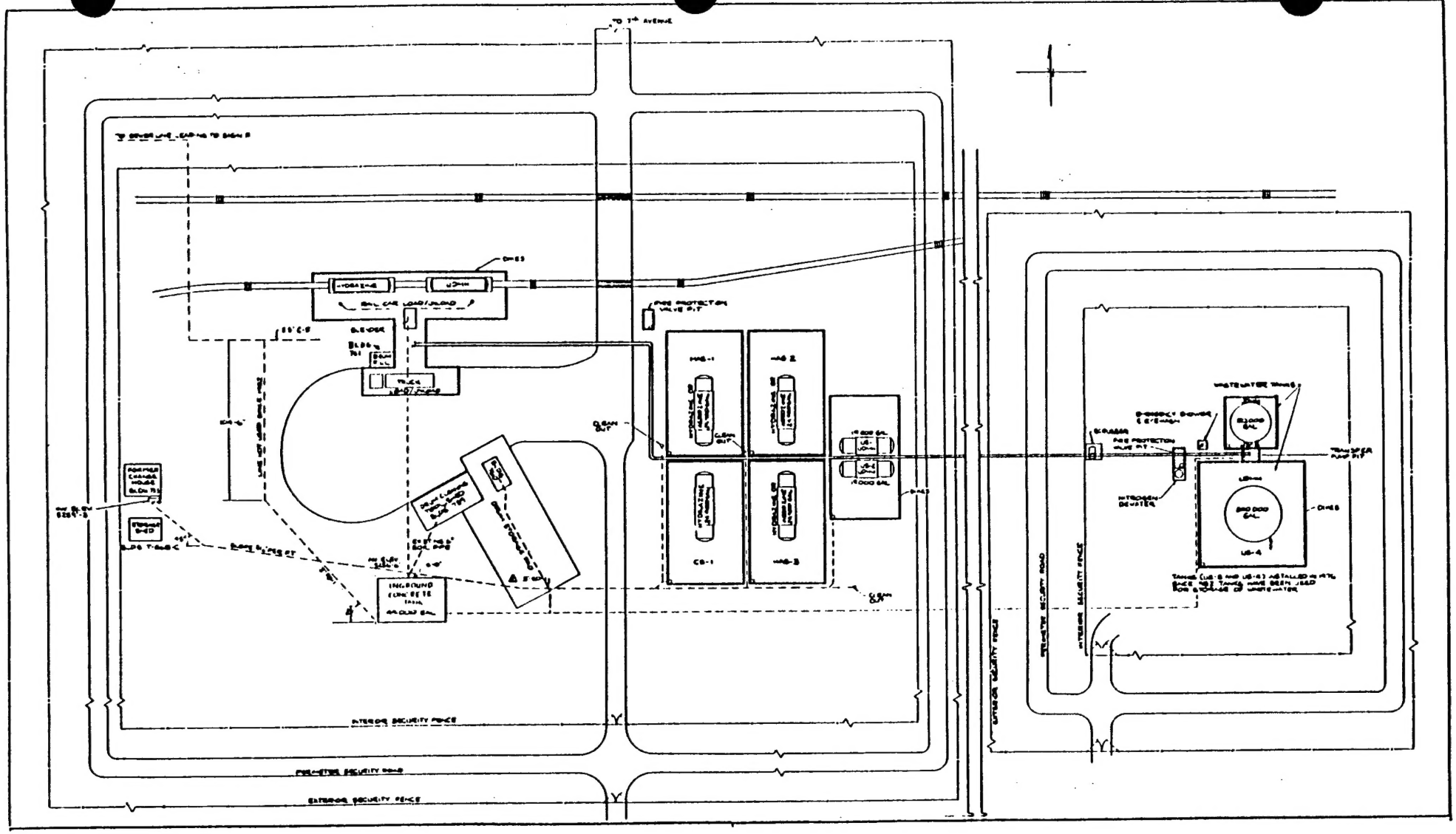

Figure 3. Schematic Layout of the HBSF

Source: Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, Version 3.1, Ebasco Services Incorporated, June 1988.

Table 1. Major Equipment and Structures Located at the Hydrazine Blending and Storage Facility

Item	Description
Railroad Tank Car Facility	
Enclosed Area	120'-0" x 30'-0"
Function	Unloading of anhydrous hydrazine and UDMH from railroad tanker cars
Construction Material	Reinforced concrete. Metal sheets.
Blender	
Function	Blend Hydrazine and UDMH to produce Aerozine 50
Construction Material	Reinforced concrete. Metal sheets.
Drum Loading Station (Bldg. 761)	
Area	22'-0" x 10'-0"
Function	Loading of Aerozine 50
Construction Material	Reinforced concrete
Truck Loading Station	
Area	60'-0" x 18'-0"
Function	Loading of Aerozine 50 into tanker trucks
Office Shed/Change House (Bldg. 755)	
Size	20'-0" x 24'-0" x 9'-0"
Function	Clothing change and showers (until late 1970's). Glycol recirculating pump and heat exchanger housing.
Construction Material	8" masonry (concrete block)
Inground Concrete Tank	
Area	40'-0" x 26'-0"
Volume	44,000 gallons
Function	Receive wastewater and stormwater runoff
Construction Material	Concrete
Building 759	
Size	40'-0" x 20'-0" x 10'-0"
Function	Drum cleaning
Construction Material	Metal siding/metal roofing

Source: Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, Version 3.1, Ebasco Services Incorporated, June 1988.

Table 1 (continued).

Item	Description
Shelter (Bldg. 760)	
Location	In drum storage area
Function	Forklift storage
Size	20'-0" x 10'-10"
Storage Shed (Bldg. T-686-C)	
Size	13'-6" x 22'-0" (estm.)
Function	Storage of miscellaneous building materials
Construction Material	Wood
Drum Storage Pad	
Size	70'-0" x 45'-0" x 6"
Function	Storage of drums
Aerozine Storage Tanks	
Number of Tanks	3 (HAS-1, HAS-2, HAS-3)
Geometric Shape	Cylindrical, Horizontal
Volume	24,900 gallons
Construction Material	Stainless steel
Location	Inside concrete dikes
Size of Dike	53'-6" x 47'-0" x 5'-0"
Anhydrous Hydrazine Storage Tank	
Number of Tanks	1 (CS-1)
Geometric Shape	Cylindrical, Horizontal
Volume	24,900 gallons
Construction Material	Stainless steel
Prior Use	Wastewater storage
Location	Inside concrete dike
Size of Dike	53'-6" x 47'-0" x 5'-0"
UDMH Storage Tanks	
Number of Tanks	2 (US-1, US-2)
Geometric Shape	Cylindrical, Horizontal
Volume	19,000 gallons
Construction Material	Carbon steel
Location	Inside concrete dike
Size of Dike	43'-0" x 77'-0" x 5'-0"

Table 1 (continued).

Item	Description
Wastewater Tanks	
Number of Tanks	2 (US-3, US-4)
Geometric Shape	Cylindrical, Vertical
Volume	50,000 gallons and 200,000 gallons
Construction Material	Carbon steel
Prior Use	UDMH storage
Pumps	
Number	6 (HWP-1, HWP-2, UP-1, HAP-1, CP-1, FDP-1)
Liquids	Hot water, wastewater, UDMH, hydrazine, aerozine, contaminants.
Pipes (Above Ground)	
Diameter	2.5"
Number	18 (U-1, U-2, U-3, U-4, HA-1, HA-2, HA-3, HA-4, HA-5, A-1, A-2, H-1, H-2, C-1, C-2, C-3, C-4, C-5)
Diameter	3.0"
Number	2 (HWR-1, HWS-2)
Diameter	4.5"
Number	1 (V-1)
Scrubbers	
Number	2
Location	One at blender area, one at wastewater tank area.
Fire Protection Valve Pit	
Number	2
Location	One near hydrazine/aerozine tank area, one near wastewater tank area.

On February 1, 1988, a proposed Consent Decree was lodged in the case of U.S. v. Shell Oil Company with the U.S. District Court in Denver, Colorado. This Decree was commented on by the public and a modified proposed Consent Decree was filed with the Court on June 7, 1988. The Army and Shell Oil Company agreed to share certain costs of the cleanup that is being developed and will be performed by the Army under the oversight of the EPA, with numerous opportunities for comment by the State of Colorado. The long term cleanup is is a complex task that will take several years to complete. To facilitate more immediate remediation activities, the Consent Decree specifies a number of interim actions to alleviate the most urgent problems. One of these interim actions is at the HBSF.

3.0 INTERIM RESPONSE ACTION OBJECTIVES

The objectives of the HBSF IRA are to meet the following specific criteria:

- Treat wastewater to levels that will effectively eliminate any substantial risks to human health and the environment associated with the contaminants of concern including hydrazine, MMH, UDMH, and NDMA.
- Use treatment technology that is technically feasible and readily implementable.
- Achieve permanent remediation through destruction of contaminants of concern to designated action levels or reduce the toxicity, mobility, or volume of wastewater.
- Be cost-effective.
- Comply with designated Applicable or Relevant and Appropriate Requirements to the maximum extent practicable.

This decision document provides a summary of the alternatives considered, a chronology of the significant events leading to the initiation of the IRA, a summary of the IRA project, and a summary of the Applicable or Relevant and Appropriate Requirements, standards, criteria, or limitations (ARARs) associated with the program.

4.0 INTERIM RESPONSE ACTION ALTERNATIVES

Wastewater treatment alternatives were examined in the June, 1988 Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, Version 3.1 (Ebasco Services Incorporated, 1988), prepared for the Office of the Program Manager for the Contamination Cleanup of Rocky Mountain Arsenal.

The No Action alternative was quickly dismissed as unacceptable. Approximately 270,000 gallons of wastewater are currently stored in various tanks at the HBSF. The storage of wastewater is the suspected cause of trace levels of NDMA in the air. The No Action alternative would not provide any remediation of the HBSF, nor would it result in reduced levels of NDMA.

The following 17 wastewater treatment alternatives were considered:

- Biological Treatment
  - On-Site Biological Treatment
  - Discharge to a Publically Owned Treatment Works
- Chemical Treatment
  - Chlorination
  - Chlorination/Ultraviolet (UV) Light
  - Ozonation
  - Ozone/UV Light
  - Permanganate
  - Hydrogen Peroxide and Hydrogen Peroxide/UV Light
  - Reduction Processes
- Physical Treatment
  - Activated Carbon Adsorption
  - Metal Oxide Adsorption/Catalysis
  - Evaporation Pond
  - Air Stripping
  - Steam Stripping
  - Spray Irrigation
- Thermal Treatment
  - Off-Site Incineration
  - On-Site Incineration

Table 2 summarizes the initial screening of the wastewater treatment alternatives. Eleven of the treatment alternatives, identified as being either unable to efficiently remove the contaminants without producing hazardous by-products requiring supplemental treatment or in need of substantial development in order to evaluate treatment efficiency and implement the process, were eliminated early in the evaluation process. These alternatives are summarized in Table 3.

Table 2. Summary of Initial Wastewater Treatment Alternatives Screening

Wastewater Treatment Alternative	Effective Destruction of Hydrazine Related Compounds	Rapid and Simple Implementation	Non-Hazardous By-Products and End Products
On-Site Biological Treatment	Uncertain	Yes	Uncertain
Discharge to a POTW	Uncertain	Yes	Uncertain
Chlorination	Yes	Yes	No
Chlorination/UV	Yes	Yes	Yes
Ozonation	Yes	Yes	Yes
Ozone/UV	Yes	Yes	Yes
Permanganate	Uncertain	No	Uncertain
Hydrogen Peroxide	Uncertain	Yes	Uncertain
Hydrogen Peroxide/UV	Highly Probable	Yes	Yes
Reduction Processes	Yes	No	No
Activated Carbon Adsorption	No	Yes	No
Metal Oxide Adsorption Catalysis	No	No	No
Evaporation Pond	Highly Probable	Yes	Likely; potential residues easily disposed
Air Stripping or Steam Stripping	No	Yes	No
Spray Irrigation	Uncertain	Yes	Uncertain
Incineration	Yes	Yes	Yes

Source: Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, Version 3.1, Ebasco Services Incorporated, June 1988.

Table 3. Summary of Eliminated Alternatives

Alternative	Description	Reason For Elimination	Corroborating Study
On-Site Biological Treatment	Decomposition of a substance by microorganisms (bacteria) at a RMA facility.	Undiluted HBSF wastewater contaminant concentrations generally exceed levels identified as reducing metabolic rates and would inhibit or destroy bacterial activity.	Kane and Williamson, 1980
		NDMA found to be nonbiodegradable.	Tate and Alexander, 1975, 1976
Discharge to a Publically Owned Treatment Works	Decomposition of a substance by microorganisms (bacteria) at a publically owned treatment works.	Wastewater can be diluted to virtually any level, but dilution does not ensure degradation will occur.	Kane and Williamson, 1980
		NDMA found to be nonbiodegradable.	Tate and Alexander, 1975, 1976
Chlorination	Chlorine, an oxidizing agent, supports chemical oxidation of a substance.	Oxidization by chlorine can destroy hydrazine and related compounds, but is often incomplete and produces undesirable chlorinated by-products that would require additional treatment.	Brubaker et al., 1985 Castegnaro et al., 1986 Neumann and Jody, 1986
Permanganate	Permanganate, a common, strong, oxidizing agent, supports combustion of a substance by supplying oxygen.	Unconfirmed effectiveness in degrading NDMA. Manganous oxide solid, a permanganate reduction product, would require disposal.	Castegnaro et al., 1986

Table 3 (continued).

Alternative	Description	Reason For Elimination	Corroborating Study
Reduction Processes	Chemical process in which the loss of electrons from a substance (reducing agent) results in the conversion of a hydrazine related compound to its corresponding amine which may be more easily handled and disposed.	Process successfully reduced hydrazine, MMH, UDMH and NDMA, but has not been developed beyond laboratory stage. Reduction of NDMA and UDMH generates dimethylamine, a hazardous substance by-product that would require subsequent treatment.	Lunn et al., 1983 a, b
Activated Carbon Adsorption	Adherence of molecules of hydrazine and related compounds to the surface of carbon "activated" by heating to 800-900°C with steam or carbon dioxide.	NDMA, MMH, and UDMH poorly adsorbed onto activated carbon due to low molecular weight and chemical structure.	EPA, 1979
Metal Oxide Adsorption/ Catalysis	Adherence of molecules of hydrazine and related compounds to the surface of metal oxides. Metal oxide surface may cause the loosening of chemical bonds between substances and accelerate the rate of hydrazine related compound destruction.	Adsorption of NDMA onto metal oxides has not been well studied and removal efficiency is uncertain. Adsorption onto metal oxides transfers hydrazine compounds to different media (liquid to solid) rather than destroys them.	Hayes et al., 1982 Braun and Zirroli, 1983 Heck et al., 1963

Table 3 (continued).

Alternative	Description	Reason For Elimination	Corroborating Study
Air Stripping	Process in which volatile hydrazine and related compounds in water or soil are transferred to gas.	Air stripping transfers contaminants from water to air rather than destroys them. Inefficient separation of hydrazine from water into vapor.	Wilson et al., 1955
Steam Stripping	Process in which hydrazine contaminated wastewater is heated to approximately 140°F and volatile compounds are transferred to gas.	Steam stripping transfers contaminants from water to air rather than destroys them. Inefficient separation of hydrazine from water into vapor.	Wilson et al., 1955
Spray Irrigation	Spraying of wastewater onto soil and subsequent adsorption by soils, oxidization by air, and degradation by sunlight and microorganisms (bacteria).	If technology failed, potential groundwater contamination could endanger human health and the environment.	Ebasco Services Incorporated, 1986
On-Site Incineration	Combustion of hydrazine contaminated wastewater at temperatures from 1200-1500°C in on-site or mobile incinerator.	Existing RMA North Plants Incinerator is inadequate for assured destruction of hydrazine compounds. Use of mobile incinerators or construction of new on-site incinerator would require test burns and possible mobilization or construction delays.	Tillman, 1986

The following six alternatives, initially identified as meeting treatment efficiency and implementation requirements, were further studied:

- o Chlorination/UV light,
- o Ozonation,
- o Evaporation pond,
- o Off-site incineration,
- o Ozone/UV light, and
- o Hydrogen peroxide/UV light.

Chlorination/UV Light: This alternative consists of a recirculating or batch wastewater system incorporating chlorine contact and subsequent oxidation followed by ultraviolet light exposure. Implementation of chlorination/UV light would require installation of a chlorine dispensing system and a UV contact chamber along with the associated monitoring equipment and piping and possibly a sulfite dispensing unit. A moderate amount of effort and time would be required to install the equipment assuming personal protection is required. Alternatively, the use of a mobile treatment unit would only require hook-up to the existing piping or tanks.

Chlorination can effectively destroy NDMA, hydrazine, MMH, and UDMH. However, miscellaneous by-products are produced that require subsequent treatment. UV light applied in conjunction with chlorination aids in the destruction of the contaminants and by-products (Fochtman and Koch, 1979 and Prengle et al., 1976); however, the time required may be extensive, treatability studies would be required, and additional treatment of the chlorinated by-products may still be required. For these reasons, the chlorination/UV light alternative was not considered as a final alternative.

Ozonation: This alternative consists of on-site generation of ozone and its introduction either into a recirculating flow of wastewater through existing piping or directly into the tanks and sump. Alternatively, a mobile treatment system may be used. Venting, scrubbing, and possibly recycling of off-gases could be necessary to release reaction products and recover oxygen. A pH monitoring and control system may be necessary. Treatment would be continued until the wastewater meets concentration requirements, after which the water would be discharged.

Ozonation effectively destroys hydrazine, MMH, and UDMH through oxidation to concentrations below detection limits. Oxidation of UDMH produces NDMA which can be destroyed by continued ozonation. Miscellaneous side-products produced during the reactions are also oxidized, in time, to innocuous end-products. In addition, Prengle et al. (1976) demonstrated that ozonation aids in the destruction of chloroform and other chlorinated compounds that are present in the wastewater from past decontamination practices using chlorination. Only minor treatability studies would be required to determine the effectiveness of ozonation on the actual wastewater as ozonation has already been tested on simulated hydrazine wastewaters. Hazards associated with ozone can be avoided with proper preventive measures. Installation complexity and time requirements would be minor, because of the utilization

of existing tanks and piping and the simplicity of the operation. A mobile treatment system would be even simpler and require less time to implement.

However, ozonation was excluded as a final alternative in favor of ozone/UV light which differs from ozonation only by the addition of a UV light chamber or lamps, yet provides enhanced treatment and accelerates NDMA destruction, the treatment rate limiting factor.

Evaporation Pond: This final alternative involves construction of a lined pond according to substantive RCRA requirements or modification of existing containment structures to create a pond. HBSF wastewater, pre-treated with hydrogen peroxide solution to oxidize the hydrazine compounds, would be pumped from storage tanks into the pond. Natural degradation processes (oxidation and photolysis) would destroy the hydrazine compounds, and any NDMA formed by the oxidation of UDMH, while the water evaporated. Air monitoring devices would be placed around the pond to measure fugitive contaminant releases and a chain-link fence would surround the pond to restrict access. Treatment would continue until the water was completely evaporated, after which the pond would be decommissioned and the residues and liner disposed in a approved hazardous waste landfill.

The evaporation pond alternative can effectively treat contaminants and dispose of the water resulting in permanent remediation. Construction and implementation are simple, rapid, and safe. Overall time required for construction, operation, decommissioning, and site restoration is estimated to be 7 to 14 months. Following construction and filling of the pond, treatment can proceed without operator assistance or use of mechanical equipment. Costs are comparable to the ozone/UV light and hydrogen peroxide/UV light alternatives. Drawbacks of this alternative are that air monitoring must be conducted to ensure NDMA emission from UDMH oxidation does not exceed destruction by photolysis; limited data exists on the treatment effectiveness of NDMA photolysis in an evaporation pond; and weather variations and air monitoring requirements may cause treatment and decommissioning delays.

Off-Site Incineration: Wastewater would be pumped into rail tank cars or tanker trucks and transported to a RCRA approved incineration facility. Approximately 41 7,500-gallon tanker trucks or 21 15,000-gallon rail cars would be needed to transport the wastewater. At least two facilities, SCA in Chicago, Illinois and Rollins in Deer Park, Texas currently have the capacity, capability and availability to incinerate the wastewater.

Incineration technologies are well-established, assure virtually complete, permanent destruction of the contaminants, and can be simply, rapidly, and safely implemented. Implementation of the process would only involve a test burn and chemical analysis of the wastewater, pumping wastewater into tanker trucks or rail cars, and transport to the incinerator locations. Approximately 8 to 13 weeks would be necessary to load, transport, and incinerate the wastewater. Minor hazards associated with handling and transport can be controlled using preventive measures. However, the cost of off-site incineration is approximately three times more than the other final alternatives.

Ozone/UV Light: This alternative is similar to the ozonation alternative. An on-site mobile treatment system, shown in Figure 4, would be used for recirculating water, ozone generation, initial ozone contact, pH control, and venting of off-gases. UV light exposure would follow ozonation. The wastewater may be acidified prior to treatment to improve the treatment efficiency. Treated acidic water would be neutralized, sampled and analyzed, then discharged to RMA's sanitary sewer system if action levels are attained.

Ozonation in conjunction with UV light has been found through research (Neumann and Jody, 1986), pilot scale and treatability studies, and demonstration to very effectively and permanently destroy hydrazine compounds and NDMA to below their detection limits. Operation and maintenance requirements would be moderate consisting of sampling, analysis, and equipment inspections and servicing. The system could be easily and rapidly implemented. Mobile units would be brought to the site so that no construction or design is required. It is estimated that treatment of the existing wastewater would require approximately 6 months. Safety concerns related to potential exposures to contaminated water, releases of ozone, high voltage, and handling and transport of liquid oxygen can be controlled using preventive measures. Costs are comparable to the evaporation pond and hydrogen peroxide/UV light alternatives. Minor drawbacks in implementability include potential for remobilization due to weather restrictions, and delays in decommissioning of the tanks while wastewater generated during facility decommissioning activities and stored in the tanks is treated.

Hydrogen Peroxide/UV Light: This alternative is similar to the ozone/UV light process, except that hydrogen peroxide would be substituted for gaseous ozone. A mobile treatment system, shown in Figure 5, would be used to feed concentrated hydrogen peroxide solution to the reactor from a storage tank. UV lamps within the reactor would activate the contaminants to aid in their destruction, and cleave the hydrogen peroxide to form hydroxyl species which oxidize the contaminants to action levels. Successfully treated water would be sampled and analyzed, pH adjusted if acidic, and discharged to RMA's sanitary sewer system, if found clean. Hydrogen peroxide, when used alone destroyed NDMA with an efficiency of about 60 percent (Castegnaro and Walker, 1976). However, combined with UV light hydrogen peroxide has been demonstrated (Sundstrom and Klei, 1983) to have a much greater destruction efficiency and rate than peroxide alone. Although not demonstrated in field applications, the mechanism of action of hydrogen peroxide/UV light is similar to ozone/UV light, with ozone a somewhat stronger oxidizing agent than hydrogen peroxide. Treatability studies have indicated that the process provides essentially equivalent treatment to ozone/UV light under proper conditions. By-products can be destroyed to any desired level and the contaminants of concern are permanently destroyed. The process may be easily and readily implemented. Initially, adjustments to chemical feed and flow rates would be necessary to establish efficient operating conditions. Later, the process can be automated for continuous use. Daily inspections and periodic refilling of the hydrogen peroxide tanks would be necessary; otherwise, the process would require little servicing. The mobile system is easily set-up and requires no construction or design. Treatment of the

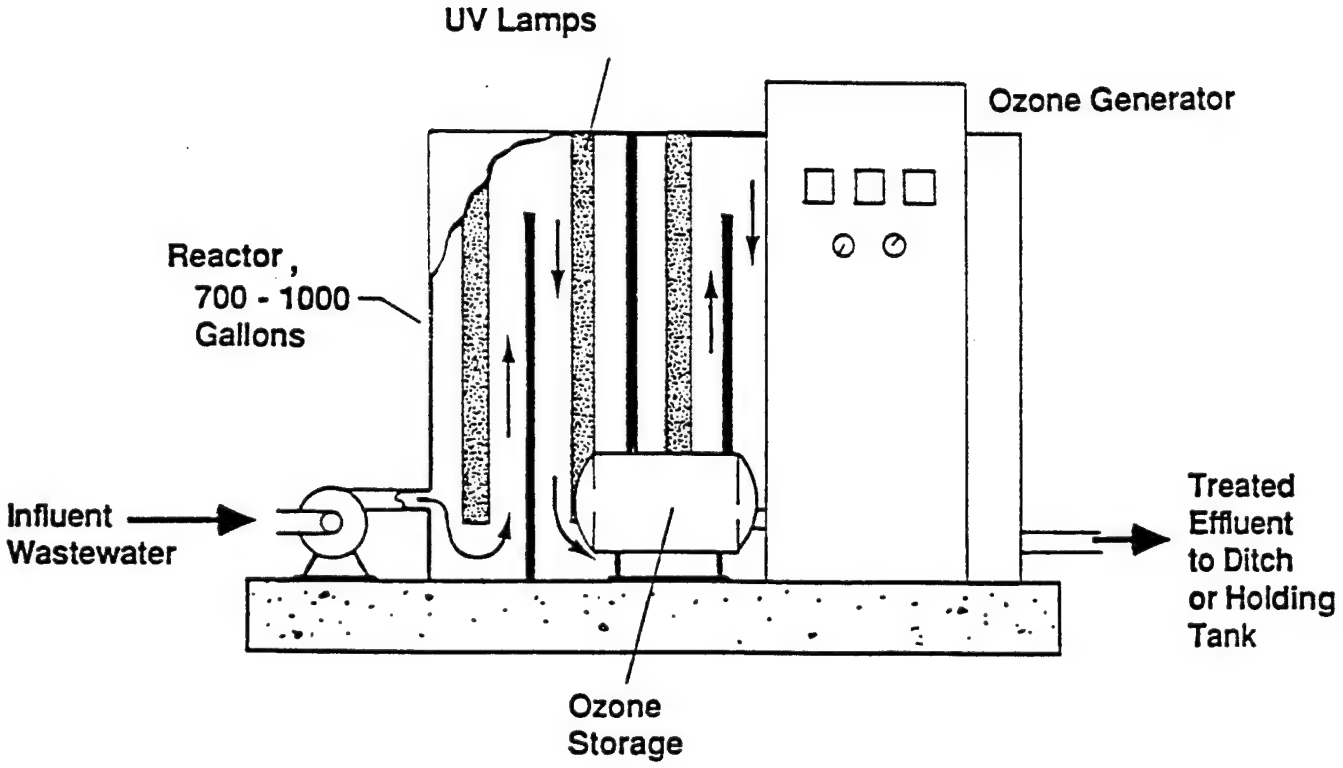

Figure 4. Ozone/UV Light On-Site Mobile Treatment System

Source: Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, Version 3.1, Ebasco Services Incorporated, June 1988.

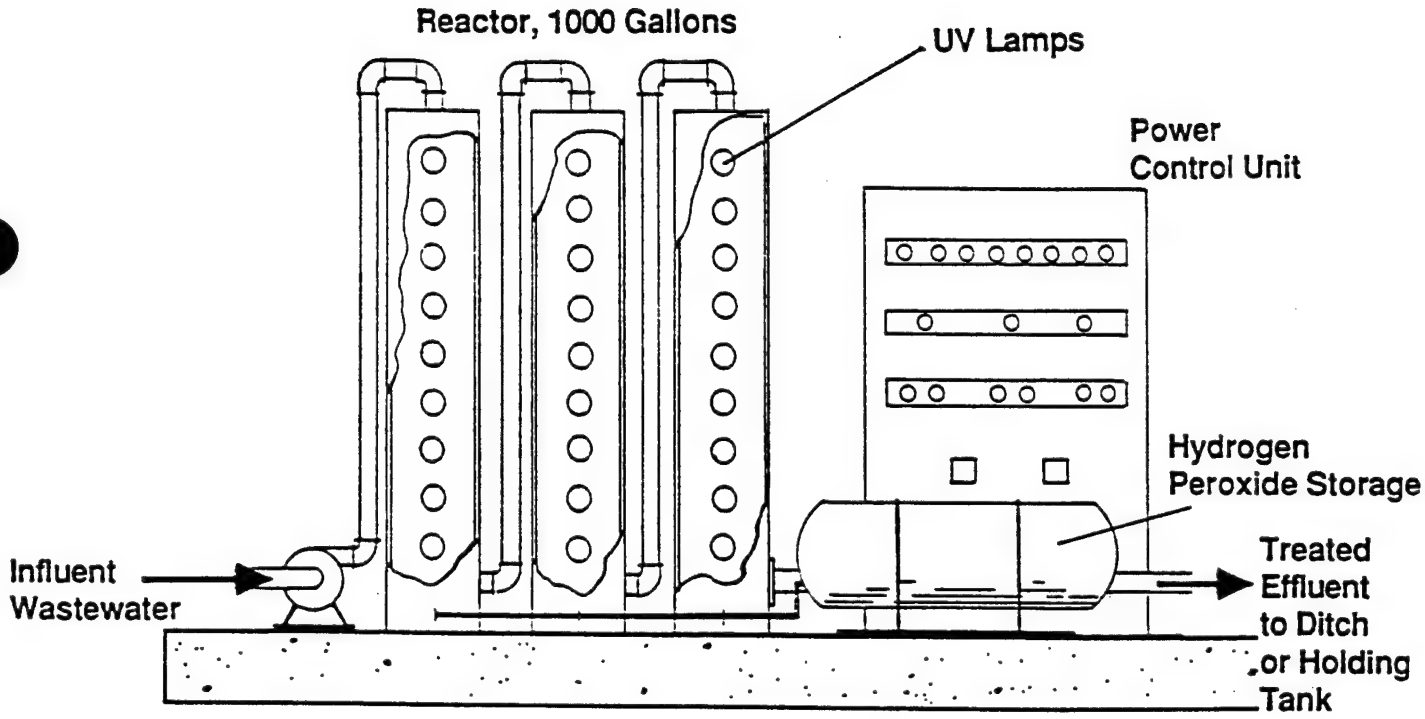

Figure 5. Hydrogen Peroxide/UV Light On-Site Mobile Treatment System

Source: Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, Version 3.1, Ebasco Services Incorporated, June 1988.

existing wastewater is estimated to take 6 months. Operation of the hydrogen peroxide/UV light system involves hazards associated with exposure to contaminated water and concentrated hydrogen peroxide. However, preventive measures and appropriate use of health and safety equipment can control these hazards, and the containment of the wastewater in a closed system reduces the likelihood of potential exposures. In addition, hydrogen peroxide is generally easier to handle than ozone and has fewer safety complications. Costs are comparable to ozone/UV light and evaporation pond alternatives. Partial delay in decommissioning due to the treatment of wastewater generated during facility decommissioning activities and stored in the tanks, and remobilization to treat additional wastewater or meet weather restrictions are drawbacks to implementability.

Table 4 summarizes the secondary screening of the wastewater treatment alternatives. Table 5 summarizes the final wastewater treatment alternatives. The recommendation of the preferred alternative is based on issues of technical feasibility and cost, since all alternatives are capable of achieving the goal of permanent cleanup. All the final alternatives provide very good protection of human health and the environment.

The evaporation pond has some practical advantages, but limited performance data, and the potential for delayed decommissioning of the site due to weather variations and air quality concerns hinder its applicability. The remaining three alternatives are similarly feasible, but cost of the off-site incineration alternative is approximately three times that of the ozone/UV light or hydrogen peroxide/UV light alternatives.

The effectiveness of ozone/UV light and hydrogen peroxide/UV light has been demonstrated in treatability studies using HBSF wastewater. Because technical feasibility and treatment costs are similar, either ozone/UV light or hydrogen peroxide/UV light are recommended for treating the HBSF wastewater. The final selection between the two alternatives should be based upon more detailed engineering designs and cost estimates. Both systems are capable of destroying the contaminants to below detectable levels, ensuring permanent treatment and protecting human health and the environment. Documentation of treatment effectiveness during startup testing should overcome any concerns associated with the discharge of the treated wastewater.

Table 4. Summary of Secondary Wastewater Treatment Alternatives Screening

Wastewater Treatment Alternative	Criteria: Treatment Efficiency
Chlorination/UV Light	Chlorinated intermediates formed which may not be rapidly or completely destroyed.
Ozonation	Destruction of hydrazine related compounds assured, but destruction of intermediates may be slow or incomplete.
Ozone/UV Light	Destruction of hydrazine compounds and intermediates assured; process is simple.
Hydrogen Peroxide/UV Light	Destruction of hydrazine compounds and intermediates highly probable; ease of implemention improved over ozone/UV light.
Evaporation Pond	Destruction of hydrazine related compounds highly probable; process is easily implemented; potential hazardous residues easily disposed.
Off-Site Incineration	Assured destruction of all contaminants and rapid implementation.

Source: Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, Version 3.1, Ebasco Services Incorporated, June 1988.

Table 5. Summary of Final Wastewater Treatment Alternatives

Final Wastewater Treatment Alternative	Technical Feasibility	Permanence of Remedy	Protection of Human Health and Environment	Relative Cost
Ozone/UV Light	High	High	High	Comparable to Other Alternatives
Hydrogen Peroxide/UV Light	High	High	High	Comparable to Other Alternatives
Evaporation Pond	Moderate	High	High	Comparable to Other Alternatives
Off-Site Incineration	High	High	High	Three Times Cost of Other Alternatives

Source: Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, Version 3.1, Ebasco Services Incorporated, June 1988.

5.0 CHRONOLOGY OF EVENTS

Date	Event
20 September 1982	Director of Energy Management, San Antonio Air Logistics Center, Kelly AFB verbally notified RMA that hydrazine mission would be phased out, and that plan was to blend and remove all product on-hand as soon as possible.
December 1982	Memorandum of Agreement (MOA) entered into between Colorado Department of Health, U.S. Environmental Protection Agency, Shell Chemical Company, and the Army to initiate a cooperative development plan for a comprehensive remedy for the environmental situation at RMA.
7-17 December 1982	Army Environmental Hygiene Agency conducted sampling program to quantify worker exposures to NDMA, UDMH and hydrazine. Industrial Hygiene Special Study No. 55-35-0125-83 Evaluation of Potential Exposures completed by AEHA; concluded NDMA present as air contaminant, no sources of detectable quantities of hydrazine or UDMH contamination identified by air sampling.
30 December 1982	Phase I Hazard Abatement tasks substantially completed. Included installation of modified trailer to be used as Personal Decontamination Station, procurement of special respirator equipment, decontamination of blender area and inground concrete wastewater tank, award of contract for NDMA analytical lab, and design engineering for process modifications.
January 1983	AEHA air sampling indicated NDMA still present in facility (maximum of 20 ug/m^3).
April 1983	During second quarter FY83 RMA conducted intensive effort to detect and repair UDMH leaks in the fuel system. Two rounds of testing and repairing were accomplished; however, area air sampling conducted after second round still indicated presence of NDMA.
5-6 May 1983	At meeting between Air Force and Army, it was agreed that best approach to eliminate presence of NDMA was to remove all fuel and decontaminate facility.

Date	Event
August 1983	Dames and Moore conducted presurvey of HBSF facility under contract to provide recommendations on how to proceed with closure of facility.
April 1984	Revised Presurvey Report completed by Dames and Moore and received by Air Force.
October 1985	Task 11 Damage Assessment Report submitted by Ebasco.
End of April 1986	Last of hydrazine removed from HBSF and shipped to a permitted off-site disposal facility.
25 June 1986	Memorandum of Understanding established between PM-RMA and Headquarters, Air Force Logistics Command (HQ AFLC) deliniating management, technical, and financial responsibilities for the Air Force and Army with respect to decommissioning the HBSF.
1 February 1988	Proposed Consent Decree lodged in the case of U.S. v. Shell Oil Company with the U.S. District Court in Denver, Colorado. The Consent Decree specified a number of interim actions, including closure of the HBSF, to facilitate remediation activities.
April 1988	Department of the Army's Preliminary ARAR Selection and Determination of ARAR Impact for HBSF Interim Response Action, completed by Department of Justice, specified applicable or relevant and appropriate Federal or State standards, requirements, limitations and criteria that the HBSF IRA must comply with.
April 1988	Issued Draft Final Report, HBSF Wastewater Treatment and Decommissioning Assessment, Version 2.2 completed by Ebasco; concluded chemical oxidation using ozone or hydrogen peroxide combined with ultraviolet light exposure was preferred wastewater treatment alternative; and described five major activities comprising HBSF decommissioning process.
7 June 1988	Modified Proposed Consent Decree filed with Court.
June 1988	Issued Final Report HBSF Wastewater Treatment and Decommissioning Assessment, Version 3.1, completed by Ebasco.

5.1 COORDINATION WITH THE PARTIES AND THE STATE

The U.S. Environmental Protection Agency, Shell Oil Company and the State of Colorado have received copies of the HBSF reports.

6.0 SUMMARY OF THE INTERIM RESPONSE ACTION PROJECT

The HBSF Interim Response Action will involve:

1. Treatment of hydrazine wastewaters and precipitation runoff stored in the 44,000 gallon inground concrete tank and tanks US-3 and US-4, and treatment of wastewater generated during the IRA to identified action levels. The preferred method of treatment is ozone/UV light or hydrogen peroxide/UV light using a mobile treatment system. Treatment of the wastewater in tanks U-3 and U-4 and the inground concrete tank will be accomplished in 1,000 to 2,000 gallon batches. After initial treatment, wastewater will be circulated through an ultraviolet light chamber to accelerate the oxidation of hydrazine, NDMA, MMH and UDMH. Following treatment of the contaminants down to ARARs to the maximum extent practicable as verified by analysis, neutralized wastewater batches will be discharged to RMA's sanitary sewer system. Treatment system equipment will be removed and decontaminated upon completion of the IRA.

2. Removal of containerized PCB contaminated oil and transformer. PCB contaminated transformer oil will be containerized and transported to an approved off-site incineration facility. The flushed transformer housing will be disposed of at an approved off-site landfill in accordance with regulations promulgated under the Toxic Substances Control Act (15 U.S.C. Section 2601 et seq.).

3. Removal of containerized flammable liquids and ethylene glycol. Uncontaminated material suitable for reuse and therefore not subject to hazardous waste regulation (40 C.F.R. Section 261.2(a)(1)(ii)), will be removed prior to demolition. Contaminated material will be containerized and removed to an approved off-site incineration facility.

4. Asbestos removal. Friable asbestos will be removed using dry removal techniques due to the possible presence of hydrazine or NDMA, containerized, and transported to an approved off-site disposal facility in conformance with the requirements of 40 C.F.R. Part 61, Subpart M prior to the demolition of HBSF structures. This removal technique will be demonstrated to EPA Region VIII and Colorado Department of Health personnel prior to implementation.

The HBSF IRA hazard reduction plan calls for the removal of hazardous substances, pollutants, and contaminants from the site prior to demolition of the facility. Therefore, neutralization of the wastewater, removal of flammable liquids, and removal of asbestos insulation will be the initial focus of the IRA.

Removal of the PCB contaminated transformer will be delayed until there is no further need for access to electrical power at the HBSF. When hazards associated with these substances have been minimized, facility demolition will proceed.

5. Demolition of above ground HBSF structures will include removal of sheds, tanks, pads, berms, dikes, utility conduits, product transport piping, fences, railroad track and ties, and uploading/downloading truck and railcar stations. Table 6 lists the 36 tasks comprising the dismantling and demolition plan. Compacted demolition debris, which for the purposes of this IRA are assumed to be contaminated, will be removed to an approved off-site disposal facility.

6. Portions of the surface of the HBSF effected by facility demolition activities will be recontoured and revegetated at the conclusion of demolition activities.

6.1 HEALTH AND SAFETY PLAN

The contractor will be responsible for developing a site specific Health and Safety Plan (HASP) which will ensure the protection of the health and safety of employees, visitors, RMA officials and other contractors on the site. The HASP will also ensure compliance with all State, Federal, and U.S. Army occupational health and safety regulations. The HASP will be developed incorporating the guidance provided by EPA's Standard Operating Safety Guides for hazardous waste site activities (EPA, 1984). The format for the HASP must follow the format of the Health and Safety Plan for Rocky Mountain Arsenal (Ebasco Services Incorporated, 1985; Ebasco Services Incorporated, January 1986).

The HASP will require an assessment of the hazards posed by the conditions of the site and the activities of the decommissioning plan. These hazards will be addressed in a manner which allows for the efficient implementation of the decommissioning and at the same time protects the health of those people involved. All activities within the exclusion zone will require at least level B protection until it is clearly demonstrated that another level of protection is acceptable. Samples from the air and other media may be analyzed after the hazard reduction activities are complete to determine if the level B protection requirement may be downgraded. Samples will also be analyzed after decommissioning and restoration to determine if risks remain from NDMA or other hazardous material exposures.

Table 6. Dismantling and Demolition Plan Tasks

1. Demolish Building 760 leaving the floor slab which will be removed with the nonseverable equipment.

2. Demolish Building 759 leaving the floor slab which will be removed with the nonseverable equipment.

3. Demolish piping and 8 stanchions between Buildings 759 and 755. Stanchions will be cut at ground level and their footings removed. Remove and crush drums located near the truck turnaround.

4. Demolish Building 868 leaving the floor slab which will be removed with the nonseverable equipment.

5. Demolish piping and 5 stanchions between the west fence and Building 755. Stanchions will be cut at ground level and the footings removed.

6. Demolish Building 755 leaving the floor slab which will be removed with the nonseverable equipment including disposal of miscellaneous debris located inside the building.

7. Demolish piping and the 16 stanchions between Building 755 and the hydrazine loading area. Stanchions will be cut at ground level and their footings removed.

8. Demolish fire protection piping and 12 support stanchions located over the railroad loading facility. Support stanchions are bolted to a concrete slab and, hence, do not have foundations.

9. Demolish miscellaneous equipment in the hydrazine blender area including the blender, scrubber, drum filler, loading arms, and surrounding miscellaneous debris.

10. Demolish the railroad loading and truck loading platforms in the hydrazine blender area.

11. Demolish piping and 28 support stanchions between the hydrazine blender and the horizontal storage tanks including removal of stairs, handrails and metal grating attached to the stanchions. Stanchions are bolted to concrete foundations which will also be removed.

12. Demolish horizontal storage tank HAS-1. This includes removal of the fire deluge sprinkler system and stripping the insulation.

Source: Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, Version 3.1, Ebasco Services Incorporated, June 1988.

Table 6 (continued).

13. Demolish horizontal storage tank HAS-2.

14. Demolish storage tanks US-1 and 2.

15. Demolish horizontal storage tank HAS-3.

16. Demolish horizontal storage tank CS-1.

17. Demolish the fire protection deluge system over tank US-4 (200,000 gallons).

18. Strip polyurethane insulation from tank US-4 and dismantle.

19. Demolish the fire protection deluge system over tank US-3 (50,000 gallons).

20. Strip polyurethane insulation from tank US-3 and dismantle. Remove all above ground structural steel, pumps, and piping from the transfer pit.

21. Demolish and remove the concrete bermed area around tank US-3 and the concrete transfer pit. Backfill area to grade with noncontaminated soil.

22. Demolish and remove the concrete bermed area around tank US-4. Backfill area to grade with noncontaminated soil.

23. Remove miscellaneous concrete pads and structures: nitrogen pad, emergency eye wash pad, and the fire protection valve pit and outside debris. Backfill any remaining depressions with noncontaminated soil.

24. Demolish piping and 19 support stanchions connecting tanks US-3 and 4 to US-1 and 2. The stanchion foundation will be removed to a depth of 3 feet below the ground surface and backfilled with uncontaminated soil.

25. Demolish and remove the concrete berms around tanks HAS-1, 2, 3, and US-1 and 2. Backfill area to grade with noncontaminated soil.

26. Demolish and remove the concrete fire protection valve pit and backfill with noncontaminated soil.

27. Remove and dispose of 120 feet of railroad track and ties from the hydrazine blender pad. Remove the underlying drainage piping below the pad.

28. Demolish and remove the concrete slabs for Buildings 755, 868, and 759. Remove underlying drainage piping below these slabs.

Table 6 (continued).

29. Remove underground piping in the east and west areas. This includes drainage lines, potable water lines, fire protection lines, and the change house septic tank and leach field.

30. Remove buried conduits located in the east and west areas.

31. Remove above ground electrical conduits, poles and transformers located in the east and west areas.

32. Remove the pavement for the truck turnaround and other pavement in the west area.

33. Demolish and remove inground concrete tank or waste sump. Backfill area to grade with noncontaminated soil.

34. Demolish and remove the drum storage pad, with underlying piping and backfill to grade with noncontaminated soil.

35. Remove the interior chain-link fences around the east and west areas.

36. Remove the exterior barbed-wire fences around the east and west areas.

7.0 IRA PROCESS

For the HBSF IRA, the interim action process is as follows:

1. The Army requested EPA, Shell and the State of Colorado to assist in identifying on a preliminary basis any potentially applicable or relevant and appropriate Federal or State standards, requirements, limitations and criteria (ARARs).

2. The Army afforded the Department of Interior (DOI), the State, and other organizations an opportunity to participate, at the RMA Committee level, in the identification and selection of ARARs pertinent to this IRA. In this instance, the participation took the form of the Army's submitting an initial draft of this document to the RMA Committee members.

3. The Army prepared a draft HBSF IRA assessment that was submitted to the DOI, the State, and other organizations for review and comment. Comments were to be submitted up to 30 days after receipt of the draft assessment. After the close of the comment period, the Army transmited a final assessment to the DOI, the State, and other organizations.

4. The Army then issued a proposed HBSF IRA Decision Document which was subject to a 30-day public comment period and supported by an administrative record. A public meeting was held in mid-August in Denver, Colorado.

5. Promptly after the close of the comment period, the Army shall transmit to the DOI, the State, and other organizations a draft final HBSF IRA Decision Document.

6. Within 20 days of issuance of the draft final HBSF IRA Decision Document, an organization (or DOI where appropriate) may invoke Dispute Resolution.

7. After the close of the period for invoking Dispute Resolution (if Dispute Resolution is not invoked) or after the completion of Dispute Resolution (if invoked), the Army shall issue a final HBSF IRA Decision Document to the DOI, the State, and other organizations, and shall notify the public of the availability of the final HBSF IRA Decision Document with the supporting administrative record. Only preliminary design work for the IRA may be conducted prior to issuance of the final HBSF IRA Decision Document.

8. Thereafter, the HBSF IRA Decision Document will be subject to judicial review in accordance with Sections 113 and 121 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended, 42 U.S.C. Sections 9613 and 9621.

8.0 ARARs

8.1 ATTAINMENT OF ARARs

The interim action process reported to the Court on June 5, 1987 in United States v. Shell Oil Co. provides that interim response actions (including the HBSF IRA) shall, to the maximum extent practicable, attain standards, requirements, criterion or limitations under any Federal environmental law (or a more stringent promulgated standard, requirement, criterion or limitation under a State environmental or facility siting law) that is legally applicable to the hazardous substance or pollutant or contaminant concerned or is relevant and appropriate under the circumstances of the release or threatened release.

8.2 IDENTIFICATION AND SELECTION OF ARARs

By letter dated December 31, 1987, counsel for the Army requested that EPA, Shell and the State preliminarily identify in writing the potential ARARs that they believe may be pertinent to the HBSF IRA. EPA responded, no response was received from Shell, and the State responded but did not identify potential ARARs.

8.3 SELECTION OF ARARs AND DETERMINATION OF ARAR IMPACT

8.3.1 AMBIENT OR CHEMICAL-SPECIFIC ARARs

8.3.1.1 DESCRIPTION

Ambient or chemical-specific requirements set health or risk-based concentration limits or ranges in various environmental media for specific hazardous substances, pollutants or contaminants. Such ARARs set either protective cleanup levels for the chemicals of concern in the designated media, or indicate an appropriate level of discharge.

8.3.1.2 NEUTRALIZATION AND DISCHARGE OF WASTEWATER

Recent samples[1] of the subject wastewater indicate the presence of the following hazardous substances: hydrazine, MMH, UDMH, NDMA, methylene chloride, chloroform, 1,1-dichloroethane, 1,1-dichloroethylene, chloromethane, acetone, dimethylhydrazine formaldehyde, dimethyldisulfide and isiphorone.[2] The medium of concern is the wastewater.

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[1] Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, Version 3.1, Ebasco Services Incorporated, June 1988, Table 2-5, page 2-28. Samples were taken from Tanks US-3 and US-4.

[2] The presence of chlorinated compounds in the wastewater is probably the result of the use of calcium hypochlorite in rinse solutions applied to pipes and tanks and the historical practice of neutralizing wastewater with calcium hypochlorite.

Primary treatment of the hydrazine wastewater by ozone/UV light or hydrogen peroxide UV light will reduce concentrations of contaminants below detection limits or to action levels, as discussed below.[3] This treatment approach will also reduce the concentrations of chlorinated compounds present in the wastewater. Sampling of the wastewater prior to discharge to the sanitary sewer system will insure that treatment to action levels has occurred. Neutralized wastewater will then be transported by the sewer system to the RMA Sewage Treatment Plant for additional treatment prior to final discharge through the Arsenal's external outfall.

Treatment of the wastewater during the HBSF IRA is a final remedial action in the sense that after hazardous substances in the wastewater (medium of concern) are treated to identified action levels no further action is contemplated. Therefore, ARARs specifying cleanup levels (action levels) protective of human health and the environment, if pertinent, do need to be identified and applied. Health or risk based levels would afford the most protective standard. EPA Ambient Water Quality Criteria are the only health based standards which have been identified. Ambient Water Quality Criteria for NDMA identify a level of 1.4 ppt at 10^{-6}.[4] However, AWQC are not considered applicable to this interim action since they do not establish any requirements. They are considered relevant and appropriate because this is the final treatment for this wastewater prior to its release off the Arsenal.

Current detection methods certified for use at the Arsenal can only identify NDMA concentrations at 200 ppt. However, there is reason to believe that the capability will be improved in the near future. The following technology based action levels have been tentatively identified for this IRA:

Substance	Action Level
NDMA	To be determined after further testing (as close to 1.4 ppt as possible)
Hydrazine	2.5 ppb[5]
MMH	20 ppb
UDMH	25 ppb

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[3] Technology based limits are determined by the ability to detect the presence of the target chemical in wastewater samples. Currently, the Arsenal is certified to detect NDMA at 200 parts per trillion (ppt). Sampling and treatment focus on NDMA, because it is the most hazardous substance present in the wastewater, and because treatment to NDMA detection limits assures that the other substances (hydrazine, MMH, UDMH and chlorinated compounds) will be reduced to below their detection limits. New data indicated that the detection capability may be improved.

[4] No Ambient Water Quality Criteria for hydrazine, UDMH or MMH have been identified. However, since NDMA is the most hazardous, and also the most resistant to treatment, treatment of the wastewater to the action level for NDMA will assure neutralization of these other substances to below action levels.

[5] ppb; parts per billion.

While the technology-based action levels described above are pertinent in this context, they are not applicable or relevant and appropriate (except for the AWQC for NDMA discussed above), because they have never been formally enacted, promulgated or adopted by any legislative or administrative body.[6] The technology based levels identified above will be employed here by the Army as action levels for the primary treatment of the wastewater at the HBSF. Current research by Prof. B. J. Jody indicates that NDMA may be able to be detected at significantly lower concentrations. These new methods will be tested on HBSF wastewater to evaluate whether a lower detection limit may be established for NDMA. The advances in detection capability may also allow the Army to extrapolate a treatability curve that gives confidence that the AWQC can be attained through treatment for a period of time after the detection limit is reached. If such an extrapolation can be made based upon the data developed, the Army will apply an increased treatment period which would apparently attain the AWQC. Furthermore, the treatment system effluent will pass through the sanitary sewer treatment system and undergo additional natural oxidation when discharged to First Creek before flowing off the Arsenal, providing an additional margin of safety in the protection of human health and the environment.

8.3.1.3 REMOVAL OF DEMOLITION DEBRIS

Demolition of the HBSF constitutes a removal action. Since final remediation of soil and groundwater is beyond the scope of this interim action, ARARs identifying site-specific cleanup levels are neither applicable, nor relevant and appropriate in this instance.

8.3.2 LOCATION - SPECIFIC ARARs

8.3.2.1 DESCRIPTION

Location-specific requirements set restrictions on activities depending on the characteristics of the site or its immediate environment. These requirements function like action-specific requirements. Alternative remedial actions may be restricted or precluded depending on the location or characteristics of the site and the requirements that apply to it.

The HBSF IRA involves only the removal of existent facilities. No new buildings, production, treatment or storage facilities are to be erected in connection with this IRA. Therefore, no site-specific ARARs for the construction of new facilities have been identified.

A variety of wildlife can be found at the Arsenal. The proposed Consent Decree generally provides for the preservation and management of wildlife at the Arsenal, including endangered species, migratory birds and bald eagles. While the decree itself is not an ARAR, its provisions regarding the preservation of wildlife must be applied to the HBSF IRA. Additionally, provisions of the Endangered Species Act of 1973, 16 U.S.C. Section 1536 et

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[6] To be binding, Section 121(d) of CERCLA, 42 U.S.C. Section 9601 et seq., requires Federal or State requirements to be legally applicable or relevant and appropriate.

seq., must be incorporated into the HBSF IRA where site-specific conditions warrant such application.

The HBSF occupies a relatively flat area in an open field. No trees or other roost or perch sites for bald eagles have been identified in this area. Likewise, no standing liquid, pond or basin which might attract migratory waterfowl is located in this area. Further, no prairie dog colonies have been located in this area (an important factor since prairie dogs provide a prey base for the bald eagles). Given the absence of wildlife in the area and the unlikelihood of wildlife being impacted by the HBSF IRA , no action need be considered in this context.[7]

8.3.3 ACTION-SPECIFIC ARARs

8.3.3.1 DESCRIPTION

Action-specific ARARs set controls or restrictions on particular kinds of activities related to the management of hazardous substances, pollutants or contaminants. These action-specific requirements may specify particular performance levels, actions or technologies, as well as specific levels (or a methodology for setting specific levels) for discharges or residual chemicals.

The following warrant consideration as ARARs in connection with the HBSF IRA:

8.3.3.2 REMOVAL OF PCB CONTAMINATED TRANSFORMER STATUTORY AUTHORITY: TOXIC SUBSTANCES CONTROL ACT (TSCA) 15 U.S.C. SECTION 2601 et seq.

One of the five electrical transformers on-site at the HBSF contains PCB contaminated oil in the 50 ppm to 500 ppm range. Removal of the transformer and disposal of the contained oil, and associated waste generated during removal, must be in conformance with those regulations promulgated under TSCA, 15 U.S.C. Section 2601 et seq. The Army has preliminarily identified the following ARARs as applicable to the HBSF IRA:

(i) 40 C.F.R. 761.60(a)(2) -- Disposal of PCB-Contaminated Electrical Equipment, mineral oil.

(ii) 40 C.F.R. 761.60(b)(4) -- Disposal Requirements. Any PCB-Contaminated Electrical Equipment must be disposed of in accordance with this regulation. The transformer must be drained of all free flowing liquid. The liquid must be disposed of pursuant to 40 C.F.R. Section 761.60(a)(2) or (3).

All drained PCB liquids, if incinerated, must be destroyed in an incinerator that complies with 40 C.F.R. Section 761.70.

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[7] Information concerning wildlife has been verified with representatives of the U.S. Fish and Wildlife Service.

(iii) 40 C.F.R. Section 761.65 -- Storage For Disposal. Generally, PCBs in concentrations of 50 ppm to 500 ppm must be stored in a structure that prevents rainwater from reaching the stored items. The floor and curbing of the structure must be impervious and able to contain a spill equal to twice the volume of the largest container or alternatively, contain at least 25 percent of the total volume of all stored PCBs. 40 C.F.R. Section 761.65(c)(1) provides a limited exception to this requirement for items stored for up to 30 days after removal. In any event all containers used to store PCBs must be constructed in conformance with the Shipping Container Specifications of the Department of Transportation, 49 C.F.R. Part 178.

(iv) 40 C.F.R. Section 761.79 -- Decontamination. Any container used to store PCBs, or equipment which has come into contact with PCBs, must be decontaminated by flushing with solvent in accordance with this section. Solvents used to flush equipment and containers shall be disposed of in accordance with 40 C.F.R. Section 761.61(a)(4).

(v) 40 C.F.R. Sections 761.60 and 761.65 -- Transportation. Transportation of PCBs must be done in accordance with the provisions of these sections. Additionally, transportation methods must conform to Department of Transportation hazardous material regulations 49 C.F.R. Section 173.510. For reasons discussed elsewhere within this document, RCRA regulations are not applicable to this IRA. However, recordkeeping and manifest requirements specified in 40 C.F.R. Parts 262 and 263 are relevant and appropriate with regard to the transportation of PCB liquids and contaminated transformers.

(vi) 40 C.F.R. Section 761.40 -- Marking requirements for PCB Containers transported by vehicles.

(vii) 40 C.F.R. Section 761.180(a) -- Recordkeeping Requirements.

In order to comply with the above regulations, the HBSF IRA shall require all containers and equipment exposed to PCBs to be properly labeled. Liquid PCB shall be drained from the suspect transformer and placed in a DOT approved container. The transformer itself shall be rinsed with solvent in accordance with specified procedures and all liquid used in the rinse process shall be collected and properly containerized. All containerized PCB liquid shall be disposed of by incineration not more than 30 days after removal from the transformer. Incineration of PCBs will be accomplished by shipment to an approved incinerator facility. The empty, flushed, transformer shall be disposed of at an approved off-site disposal facility.

8.3.3.3 REMOVAL OF ASBESTOS INSULATION STATUTORY AUTHORITY: CLEAN AIR ACT, AS AMENDED, 42 U.S.C. SECTIONS 7412 and 7601 (a)

The HBSF IRA will involve the removal and disposal of materials suspected of containing friable asbestos. Those materials are: above ground piping, insulation on equipment, building insulation and insulation on pipes within

buildings.[8] Federal regulations promulgated to Sections 112 and 301(a) of the Clean Air Act, 42 U.S.C. Sections 7412 and 7601(a), as amended, contain regulations which are applicable[9] to this IRA. The Army has preliminarily identified the following Federal regulations as applicable ARARs:

(i) 40 C.F.R. Section 61.145 -- Standard for demolition and renovation: Applicability;

(ii) 40 C.F.R. Section 61.146 -- Standard for demolition and renovation: Notification requirements;

(iii) 40 C.F.R. Section 61.147 -- Standard for demolition and renovation: Procedures for asbestos emission control;

(iv) 40 C.F.R. Section 61.152 -- Standard for waste disposal for manufacturing, demolition, renovation, spraying, and fabricating operations;

(v) 40 C.F.R. Section 61.152 -- Reporting;

(vi) 40 C.F.R. Section 61.156 -- Active waste disposal sites.

Generally, these regulations require the following procedures: 40 C.F.R. Section 61.145 applies the criteria outlined in Sections 61.146 and 61.147 to sites if the amount of friable asbestos exceeds 260 linear feet of pipe insulation. The volume of asbestos insulated materials to be removed during the HBSF IRA exceeds 260 linear feet. Section 61.146 requires the owner or operator to notify the EPA Administrator of the removal and proscribes the timing and contents of the notice. Section 61.147 specifies procedures for minimizing asbestos emissions during demolition. It requires friable asbestos bearing material to be removed prior to demolition unless it is encased in concrete or similar material and is wetted during demolition. Otherwise, asbestos bearing material is to be removed in units or sections prior to demolition. If sections are removed, further stripping of the asbestos is to be done while the material is sufficiently wet to prevent release of particulates. Alternatively, stripping can be done in a closed facility where the air is filtered to prevent a release to the outdoors. Section 61.152 specifies disposal standards. Those standards require that

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[8] Asbestos insulation, along with other demolition debris, is assumed to be contaminated with hydrazine, NDMA, UDMH and MMH.

[9] The State of Colorado has been delegated the authority under the Clean Air Act, 42 U.S.C. Section 7401 et seq., to administer a State NESHAPS program. State regulations pertaining to the control of hazardous air pollutants are contained in 5 CCR 1001-10, Part II, Regulation 8. Parallel Federal regulations, 40 C.F.R., Part 61, Subpart M, are as, or more stringent, than the Colorado regulations and, therefore, have been incorporated herein as applicable ARARs.

the removed asbestos be; (a) mixed with water, (b) compressed into nonfriable forms or, (c) disposed of in a manner otherwise approved by the EPA Administrator. During the removal, precautions must be taken to prevent any visible emissions to the outside air resulting from the collection, stripping and wetting operations. Removed asbestos generally must be deposited in an approved waste disposal site which conforms with the requirements of 40 C.F.R. Section 61.156. Due to the presence of other contaminants, the Army intends to dispose of this material in a facility which complies with the standards of 40 C.F.R. Part 264 for disposal of hazardous waste.

The HBSF IRA will attain compliance with these ARARs. The notice provision of 40 C.F.R. Section 61.146 are procedural and under Section 121(e) of CERCLA, 42 U.S.C. 9601 et seq., as amended, are not binding. Nonetheless, the ARAR review process itself will provide equivalent information.

Removal of friable asbestos before demolition, except in specific circumstances, is required under 40 C.F.R. Section 61.147. The HBSF IRA hazard abatement plan specifies that friable asbestos will be removed before facility demolition commences.

Under Section 61.147 friable asbestos is to be wetted sufficiently so as to prevent emission of particulates. As previously noted, some of the material to be removed is likely to be contaminated with hazardous substances. The addition of water to hazardous substances prior to landfill disposal is generally prohibited. Additionally, wetting prior to removal may facilitate the migration of the hazardous substances into soil, surface water and groundwater. To avoid these consequences, the HBSF IRA proposes the following method of dry asbestos removal. Asbestos insulated pipes and equipment will be removed by breaking it into units or segments.[10] Where asbestos insulation must be stripped from pipe or equipment (which is either in-place, or has been removed in segments), air-tight plastic bags with built-in work gloves will be placed over the work area and sealed prior to insulation stripping. When stripping is complete, or as bags become full, the bags will be sealed for disposal. This method should result in a reduction of particle emissions equivalent to that achieved by wetting before removal.

40 C.F.R. Section 61.152 specifies conditions which attach to asbestos disposal. In accordance with this section, all containers used for disposal will be properly labeled. This section also specifies that in preparation for disposal, friable asbestos is to be wetted or reduced by compression into a nonfriable form. Alternative methods which obtain the same results are permissible. Containerization in the plastic bags during the removal of the asbestos will attain the desired result of minimizing particulate emission during the disposal process.

40 C.F.R. Section 61.156 specifies the type of facility at which asbestos can be disposed and regulates the disposal process. Asbestos bearing demolition debris generated by the HBSF IRA will be disposed of at an off-site facility

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[10] Breaking as opposed to cutting asbestos insulation minimizes particulate emissions.

which satisfies the criteria enumerated in this section. Due to the presence of other contaminants, the Army intends to dispose of this material in a facility which complies with the standards of 40 C.F.R. Part 264 for disposal of hazardous waste.

Pursuant to Sections 1109 and 301(a) of the Clean Air Act, as amended, 42 U.S.C. Sections 7409 and 7601(a), additional regulations regarding national primary and secondary ambient air quality standards for particulate matter have been promulgated at 40 C.F.R. Part 50. These requirements are neither applicable, nor relevant and appropriate to the HBSF IRA. These regulations are applicable to Air Quality Control Regions (AQCR) and, in the case of New Source Performance Standards, to specific processes. The activity contemplated in this IRA does not include any of the specific processes regulated. The scope of the activity involved in this IRA is significantly minor so no effect will result on the air quality within the AQCR. Under these facts, the ambient air quality standards are neither applicable nor relevant and appropriate to apply in the context of this IRA. Demolition practices during the HBSF IRA will incorporate standard industry practices to suppress dust and particle emissions. More specific details of these dust and particle emission control practices will be contained in the Implementation Document and the Health and Safety Plan developed by the contractor for this IRA

8.3.3.4 TRANSPORTATION OF HAZARDOUS SUBSTANCES TO OFF-SITE DISPOSAL FACILITIES STATUTORY AUTHORITY: SECTIONS 1006, 2002, 3002, 3003, 3004, 3005, and 3017 OF THE SOLID WASTE DISPOSAL ACT, AS AMENDED BY THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA), 42 U.S.C. SECTIONS 6906, 6912, 6922, 6923, 6924, 6925 AND 6937

As previously noted, RCRA does not apply to the HBSF IRA, because it fails to meet the requisite jurisdictional requirements. Under the provisions of CERCLA Section 121(d), however, the Army has preliminarily identified substantive regulations found at 40 C.F.R. Part 262 which were promulgated pursuant to the above referenced sections of RCRA as relevant and appropriate ARARs.[11]

(i) 40 C.F.R. Section 262.20, Subpart B -- Manifest; General Requirements;

(ii) 40 C.F.R. Section 262.30, Subpart C -- Pre-Transport Requirements;

(iii) 40 C.F.R. Section 262.40, Subpart D -- Recordkeeping and Reporting.

40 C.F.R. Section 262.20 essentially provides for a manifest that identifies the nature and volume of hazardous waste to be transported, the generator responsible, the transporter and the designated disposal facility. 40 C.F.R. Section 262.23 describes the use of the manifest.

40 C.F.R. Section 262.40 sets forth criteria which describes how the generator must retain manifest records. 40 C.F.R. Subpart C, Sections 262.30 through 262.33 address packaging, labeling, marking and placarding requirements which are prerequisites to the transportation of hazardous waste. These sections incorporate by reference Department of Transportation Regulations found at 49 C.F.R. Parts 172, 173, 178 and 179. The HBSF IRA

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[11] State regulations found at 6 CCR 1007-3, Subparts B, C and D contain analogous regulations.

shall attain compliance with the identified ARARs for those hazardous substances, pollutants and contaminants to be disposed of in off-site facilities as follows: All shipments of hazardous waste from the site will be documented in accordance with the above referenced sections of 40 C.F.R. Part 262, Subparts B and D recordkeeping requirements. Transportation of the hazardous waste will be accomplished by retaining an authorized transporter. Twenty-five-ton rear dump trailers or flatbed trailers will be used.[12] Trailers may move over public roads or via railcar. Prior to loading, waste will be compacted to reduce volume. Trailers will be double-lined with 3 to 10 mil polyethylene sheets which will be used to wrap the solid wastes. Tarps will then be placed over the liners to both protect the liners and to further isolate the wastes during transportation. All wastes will only be transported to permitted hazardous waste landfills.

8.3.3.5 GENERAL CONSTRUCTION ACTIVITIES

The following performance, design or other action-specific State ARARs have been preliminarily identified by the Army as relevant and appropriate to this portion of the HBSF IRA and are more stringent than any applicable or relevant and appropriate Federal standard, requirement, criterion or limitation:

(i) Colorado Air Pollution Control Commission Regulation No. 1, 5 CCR 100-3, Part III(D)(2)(b), "Construction Activities":

a. Applicability - Attainment and Nonattainment Areas

b. General Requirement - Any owner or operator engaged in cleaning or leveling of land or owner or operator of land that has been cleared of greater than one acre in nonattainment areas from which fugitive particulate emissions will be emitted shall be required to use all available and practical methods which are technologically feasible and economically reasonable in order to minimize such emissions in accordance with the requirements of Section III.D. of this regulation.

c. Applicable Emission Limitation Guideline - Both the 20 percent opacity and the no off-property transport emission limitation guidelines shall apply to construction activities; except that with respect to sources or activities associated with construction for which there are separate requirements set forth in this regulation, the emission limitation guidelines there specified as applicable to such sources and activities shall be evaluated for compliance with the requirements of Section III.D.2 of this regulation. (Cross Reference: Subsections e. and f. of Section III.D.2 of this regulation.)

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[12] No more than 44,000 pounds of waste would be placed in a single trailer in order to comply with the State of Colorado Department of Transportation gross vehicle weight limitations for the transportation of hazardous waste.

d. Control Measures and Operating Procedures - Control measures or operational procedures to be employed may include, but are not necessarily limited to, planting vegetation cover, providing synthetic cover, watering, chemical stabilization, furrows, compacting, minimizing disturbed area in the winter, wind breaks and other methods or techniques.

(ii) Colorado Ambient Air Quality Standards, 5 CCR 1001-14, Air Quality Regulation A, "Diesel-Powered Vehicle Emission Standards for Visible Pollutants":

a. No person shall emit or cause to be emitted into the atmosphere from any diesel-powered vehicle any air contaminant, for a period greater than 10 consecutive seconds, which is of such a shade or density as to obscure an observer's vision to a degree in excess of 40 percent opacity, with the exception of Subpart b below:

b. No person shall emit or caused to be emitted into the atmosphere from any naturally aspirated diesel-powered vehicle of over 8,500 lbs gross vehicle weight rating operated above 7,000 feet (mean sea level), any air contaminant for a period greater than 10 consecutive seconds, which is of such a shade or density as to obscure an observer's vision to a degree in excess of 50 percent opacity.

c. Diesel-powered vehicles exceeding these requirements shall be exempt for a period of 10 minutes, if the emissions are a direct result of a cold engine start-up and provided the vehicle is in a stationary position.

d. This standard shall apply to motor vehicles intended, designed and manufactured primarily for use in carrying passengers or cargo on roads, streets and highways.

(iii) Colorado Noise Abatement Statute, C.R.S. Section 25-12-103:

a. Every activity to which this article is applicable shall be conducted in a manner so that any noise produced is not objectionable due to intermittence, beat frequency, or shrillness. Sound levels of noise radiating from a property line at a distance of 25 feet or more, therefrom, in excess of the db(A) established for the following time periods and zones shall constitute prima facie evidence that such noise is a public nuisance:

Zone	7:00 a.m. to next 7:00 p.m.	7:00 p.m. to next 7:00 a.m.
Residential	55 db(A)	50 db(A)
Commercial	60 db(A)	55 db(A)
Light Industrial	70 db(A)	65 db(A)
Industrial	80 db(A)	75 db(A)

b. In the hours between 7:00 a.m. and the next 7:00 p.m., the noise levels permitted in Subpart a of this section may be increased by 10 db(A) for a period of not to exceed 15 minutes in any 1-hour period.

c. Periodic, impulsive, or shrill noises shall be considered a public nuisance when such noises are at a sound level of 5 db(A) less than those listed in Subpart a of this section.

d. Construction projects shall be subject to the maximum permissible noise levels specified for industrial zones for the period within which construction is to be completed pursuant to any applicable construction permit issued by proper authority or, if no time limitation is imposed, for a reasonable period of time for completion of project.

e. For the purposes of this article, measurements with sound level meters shall be made when the wind velocity at the time and place of such measurement is not more than 5 miles per hour.

f. In all sound level measurements, consideration shall be given to the effect of the ambient noise of the environment from all sources at the time and place of such sound level measurement.

8.3.3.6 REGULATIONS PROTECTIVE TO WORKERS

Because of the possibility that workers employed to conduct the HBSF IRA may be exposed to airborne contaminants, air monitoring at the site will be required during the duration of the action. The Army has preliminarily identified the following OSHA Permissible Exposure Limits (PELs) as pertinent to this action. Should monitoring detect the presence of substances above these limits, protective action, including, but not limited to, breathing apparatus and protective clothing, will be employed.

Substance	Exposure Limit
Hydrazine	8-hour TWA[13]: 0.1 ppm (skin)
NDMA	No Permissible Contact Level
Methylene chloride	8-hour TWA: 500 ppm
Chloroform	CL[14] 50 ppm
1,1- dichloroethane	8-hour TWA: 200 ppm
1,1- dichloroethylene	8-hour TWA: 5 ppm

Because of the absolute prohibition on worker contact with NDMA, level B protective garb will be worn by all workers in areas where NDMA is detected.

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13 TWA; Time Weighted Average.
14 CL; Ceiling Limit.

9.0 SCHEDULE

The implementation and completion deadlines required by the Consent Decree cannot be provided at this time. Under the present circumstances (treatment time and detection level to be determined per response to comments from the EPA and State), it is more appropriate to include those milestones in the Implementation Document.

The HBSF IRA Draft Implementation Document will be completed September 18, 1989. This milestone for the HBSF IRA has been developed after consideration of comments received and upon the assumption that no dispute resolution will occur. If events occur which necessitate a schedule change or extension, the change will be incorporated in accordance with the discussion in Section XVIII of the RI/FS Process Document.

10.0 CONSISTENCY WITH THE FINAL REMEDIAL ACTION

The HBSF IRA, to consist of treatment and disposal of stored wastewater and dismantlement and disposal of above ground structures and equipment, will be conducted by the U. S. Army Program Manager's Office and is anticipated to be consistent with the final response actions to the maximum extent practicable.

11.0 REFERENCES

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APPENDIX

COMMENTS AND RESPONSES

Bruce File

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2405

AUG 25 1988

Ref: 8HWM-SR

Mr. Donald L. Campbell,
Deputy Program Manager
Office of the Program Manager
Rocky Mountain Arsenal
ATTN: AMXRM-TO
Commerce City, Colorado 80022-2180

Re: Proposed Decision Document for the Interim Response Action at the Rocky Mountain Arsenal Hydrazine Blending and Storage Facility, July, 1988

Dear Mr. Campbell:

We received a copy of the subject document on July 28, 1988, with a cover letter indicating we had until August 26, 1988 to comment. We have reviewed the Proposed Decision Document and have discussed our concerns with your staff. With the understanding that the modifications indicated in the enclosure will be reflected in the Draft Final Decision Document, we expect it will be acceptable to us. If you have questions on this matter, please contact Mr. Connally Mears at (303) 293-1528.

Sincerely,

Robert L. Duprey, Director
Hazardous Waste Management Division

Enclosure

cc: Col. W. N. Quintrell, RMA-PMO
Lt. Col. Scott P. Isaacson, DA
Thomas P. Looby, CDH
David Shelton, CDH
Patricia Bohm, Colorado AGO
Chris Hahn, Shell
R. D. Lundahl, Shell
David Anderson, DOJ
John Moscato, DOJ

2ma 8:194-½

EPA Comments on the Proposed Decision Document
for the Interim Response Action at the
RMA Hydrazine Blending and Storage Facility, July, 1988

Our understanding of pending changes is as follows:

1) The Decision Document will identify that the AWQC for NDMA of 1.4 ppt is an ARAR, which applies at the point of discharge from the treatment system. The language which implies that 200 ppt is a "protective" level will be removed.

2) The 200 ppt detection limit for hydrazine will be reevaluated in the light of the most recent research work. The certifiability of the method developed by Dr. Jody of the Illinois Institute of Technology will be considered. At least the lowest certifiable detection level will be identified in the Implementation Document and used during waste water treatment.

3) In our letter dated February 29, 1988, we proposed the extention of the length of time of treatment, beyond the time when detectable quantities still exist, to provide a margin of safety below that of the certified detection limits and approaching the MCL ARAR of 1.4 ppt at the discharge point. We now understand that procedure will be attempted and fully evaluated during a full scale production test prior to the Implementation Document. Thereafter, a determination will be made of the "maximum extent practicable" in complying with the selected ARARs. That determination will be fully documented in the Implementation Document, and will be implemented for the treatment of all the liquid wastes.

4) The implementation and completion deadlines, required by paragraph 9.8 of the proposed Consent Decree, will be included in the Implementation Document. Under the current circumstances (unknown treatment time and detection limit), it is appropriate that the Decision Document only contain a deadline for production of the Implementation Document.

5) The language on page 38, paragraph 4, regarding the non-relevance and non-appropriateness of ambient air quality standards (AAQS) will be revised. The "no public access" approach to deciding AAQS are not relevant and appropriate to this IRA will be replaced by a discussion of the pertinence of AAQS to the IRA.

6) The use of a RCRA Subtitle C hazardous waste landfill for disposal of materials off-site will be specified. The permissibility of handling cross-contaminated asbestos waste at a RCRA disposal facility will be determined.

7) The somewhat ambiguous language concerning "potential problems associated with discharge" as stated in the last paragraph of page 21 of the Decision Document will be deleted.

8) The language on page 2, paragraph 2, of the response to EPA comments on proposed ARARs, which states that UV/oxidation "will be protective to health as is best practically possible", will be revised to remove the implication that protection of health need only be achieved when it is practically possible.

9) An estimate of the organic (BOD) loading that will be placed on the sewage treatment plant by the treated wastewater from the HESF (such as methyl alcohol formation) will be performed and the impact evaluated.

10) A conflict could be interpreted between the plan to route the wastewater to the sanitary sewer system and the requirements of the current NPDES permit (CO-0021202) for the STP at the RMA. The permit states that "the discharge shall not contain any wastewater from the hydrazine blending operation and/or the cleaning of railroad cars." However, the planned discharge of <u>treated</u> wastewater to the sewer appears to be the most viable environmental option and does not present an environmental concern. Further, the permit is up for renewal and it will be appropriate to remove the requirement for those reasons.

11) Clarification will be provided about the routing of the discharge from the treatment units to the sanitary sewer system, and of the intent of the phrase "secondary treatment" - which normally implies biological oxidation.

12) Clarification will be made that PCB oil will be marked during transport, but related equipment that has already been cleaned does not need to be so marked.

13) Clarification will be made that the indicated demonstration for the dry handling technique for asbestos will be made to the state as well as to EPA. Provision will be made that bags containing asbestos wastes will not be crushed during landfilling operations.

14) Clarification will be provided that treatment will be via a batch process, and that each batch will be monitored for achievement of "maximum extent practicable" compliance with selected ARARs before discharge to the sanitary sewer.

15) We understand that there will be no ozone emissions from the selected treatment process.

16) We understand that during initial tests the Army will monitor for NDMA and for other contaminants, including chlorinated hydrocarbons. Thereafter you will select the most persistent contaminant(s) to monitor for during treatment of all the liquid wastes.

RESPONSES TO COMMENTS SUBMITTED BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VIII, ON THE PROPOSED DECISION DOCUMENT FOR THE INTERIM RESPONSE ACTION AT THE RMA HYDRAZINE BLENDING AND STORAGE FACILITY

1. Comment: EPA understands the Decision Document will identify the AWQC for NDMA as a ARAR which will be applied at the point of discharge from the system and the language implying that an action level of 200 ppt for this compound is protective will be removed.

Response: The Army considers the AWQC for NDMA relevant and appropriate to apply in the context of this IRA, measurement will take place at the completion of treatment by the IRA and language implying a contrary determination has been removed.

2. Comment: EPA understands that the current 200 ppt detection limit will be reevaluated in light of recent research work, the certifiability of the method of Dr. Jody will be considered and the lowest certifiable detection level will be identified in the Implementation Document and used during treatment.

Response: EPA's understanding is correct.

3. Comment: EPA understands that the procedure of providing further treatment beyond the time when detectable quantities exist will be evaluated during a full scale test prior to the Implementation Document and thereafter a determination made of the "maximum extent practicable" in complying with selected ARARs.

Response: EPA's understanding is correct. The Army will evaluate the potential approach of providing such treatment with the actual equipment to be used and the wastewater to be treated. Test results and determinations will then be provided in the Implementation Document.

4. Comment: Implementation and completion deadlines will be included in the Implementation Document, which is appropriate since it can not be determined at this time what detection limit will be used or the length of treatment.

Response: EPA is correct.

5. Comment: EPA understands that the language on page 38 regarding ambient air quality standards (AAQS) will be revised, replacing the "no public access" approach with a discussion of the pertinence of AAQS to the IRA.

Response: EPA is correct. This discussion has been revised.

6. Comment: EPA understands that the use of a RCRA Subtitle C hazardous waste landfill will be specified for off-site disposal and the permissibility of handling cross-contaminated asbestos waste at such facility will be determined.

Response: EPA is correct.

7. Comment: EPA understands that the language concerning "potential problems asssociated with discharge" on page 21 will be deleted.

Response: This language has been deleted.

8. Comment: The language on page 2, paragraph 2 in the response to EPA comments on ARARs implying that protection of health need only be achieved when practically possible should be revised.

Response: This language has been revised.

9. Comment: EPA understands that an estimate of the organic (BOD) loading that will be placed on the sewage treatment plant by this IRA will be performed and the impact evaluated.

Response: The Army will conduct such an estimate and evaluation.

10. Comment: EPA understands that a conflict could be interpreted between the IRA plan and the NPDES permit for the STP, since the permit does not allow discharge of wastewater from the hydrazine blending operation and/or cleaning of railroad cars. However, the planned discharge of treated wastewater to the sewer appears to be the most viable environmental option and does not present an environmental concern. Further, the permit is up for renewal and it will be appropriate to remove the requirement for those reasons.

Response: The Army understands that the discharge of treated wastewater from this IRA will not conflict with the NPDES permit and that the cited restriction will be removed from the future permit.

11. Comment: EPA understands that clarification will be provided about the routing of the discharge from treatment units to the sanitary sewer and the intent of the phrase "secondary treatment."

Response: The document has been revised to clarify this matter.

12. Comment: EPA understands that clarification will be provided that PCB oil will be marked during transport but that related equipment that has been cleaned will not need to be so marked.

Response: This clarification has been made in the document.

13. Comment: EPA understands that clarification will be made that the demonstration of the dry handling technique for asbestos will be made to the state as well as to EPA and that provision will be made that bags containing asbestos wastes will not be crushed during landfilling operations.

Response: These clarifications have been made in the document.

14. Comment: EPA understands that clarification will be provided that treatment will be via a batch process and that each batch will be monitored for achievement of "maximum extent practicable" compliance with selected ARARs before discharge to the sanitary sewer.

Response: Clarification of this treatment process has been provided in the document.

15. Comment: EPA understands that there will be no ozone emissions from the selected treatment process.

Response: EPA is correct.

16. Comment: EPA understands that during initial tests the Army will monitor for NDMA and other contaminants, including chlorinated hydrocarbons, and thereafter select the most persistent contaminant(s) to monitor during the treatment of all liquid wastes.

Response: EPA's understanding of the Army's approach is correct.

STATE OF COLORADO

COLORADO DEPARTMENT OF HEALTH

4210 East 11th Avenue
Denver, Colorado 80220
Phone (303) 320-8333

Roy Romer
Governor

Thomas M. Vernon, M.D.
Executive Director

August 26, 1988

Mr. Donald Campbell
Deputy Program Manager
Office of the Program Manager
for the Rocky Mountain Arsenal
AMXRM-PM, Building 111
Commerce City, CO 80022-2180

Re: Proposed Decision Document for the Hydrazine Blending and Storage Facility, July 1988

Dear Mr. Campbell:

Enclosed are the State's comments on the above-referenced Decision Document. As you know, the State presented its comments at the August 11, 1988 public meeting. While the enclosed comments were raised by the State and addressed by the Army at that meeting, the comments require further explanation and/or clarification prior to implementing the interim action.

If you have any questions, please contact Jeff Edson with this Division.

Sincerely yours,

David C. Shelton
Director
Hazardous Materials and
Waste Management Division

DCS/me

pc: Michael R. Hope, AGO
David L. Anderson, DOJ
Connally Mears, EPA
Mike Gaydosh, EPA
Chris Hahn, Shell Oil
Edward J. McGrath, HRO
Tony Truschel, GeoTrans

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STATE COMMENTS ON THE PROPOSED DECISION DOCUMENT
FOR THE HYDRAZINE BLENDING AND STORAGE FACILITY
JULY 1988

1. The Hydrazine Blending and Storage Facility ("HBSF") is a RCRA regulated facility, and therefore, must be closed in accordance with the Colorado Hazardous Waste Management Act ("CHWMA)". Specifically, the facility must be closed in accordance with 6 CCR 1007-3, Subpart G, Sections 265.110 et seq. Furthermore, any new treatment, storage or disposal facility constructed onsite to manage hazardous wastes presently stored at the HBSF, including surface impoundments, ozone/UV or hydrogen peroxide/UV, must be permitted under the CHWMA by the Colorado Department of Health.

2. The Decision Document selects two treatment technologies (hydrogen peroxide/UV and ozone/UV) for the management of hazardous wastewater at the HBSF. However, neither of the two technologies selected have been demonstrated to be effective in the field. Please explain the rationale for choosing the hydrogen peroxide/UV alternative over proven field tested methods such as incineration, given that the treatment efficiency of hydrogen peroxide/UV indicates that the destruction of hydrazine compounds and intermediates is only "highly probable". Therefore, the rationale for selecting the hydrogen peroxide/UV alternative requires further explanation.

3. The detection limit for NDMA is too high. A lower detection level is necessary for this compound based on its toxicity. The proposed actions levels are based on the length of treatment, disguised as detection levels, rather than health based criteria. The standards for health based action levels are two to three orders of magnitude lower than the detection limits. The lowest certifiable detection level must be identified and used during treatment.

4. The State remains concerned with the methodology used in the analysis of hydrazine and its compounds. The State has received two different responses from Mr. Stutz, Laboratory Manager for USATHAMA, regarding which analytical methods is certified by USATHAMA, colorimetric or gas chromatography. The State requests clarification as to which method is certified and proposed to be used for soils and groundwater.

5. The text states that the ozone/UV alternative would require approximately six months to complete treatment. At the August 11, 1988 public meeting Army representatives indicated that the duration of the project would be approximately 20 months. However, test results presented in the Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, June 1988, p. 2-37, indicate that greater than two and one half years would be required to meet the unacceptably high action levels proposed by the Army. These dis-

parities in length of treatment time must be clarified. Furthermore, the summary of the interim action should include a timetable which projects the starting and concluding dates.

6. As Stated in the Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, June 1988, at p. 2-29, "unknown constituents in the wastewater could interfere with the treatment." A complete analysis must be performed on the waste-water, including identification of all non-target compounds, to ensure that the proposed treatment will destroy all contaminants prior to being discharged to the sewer.

In addition, the pilot tests performed pursuant to the Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment indicated that other compounds present in the water, such as methylene chloride and acetone, were not effectively destroyed by ozone/UV treatment. The State is concerned that the Army has selected an alternative treatment methodology that does not treat all contaminants present in the waste-water.

7. The Decision Document proposes to discharge incompletely treated waste-water to the RMA sanitary sewer. The Army's current NPDES does not allow the discharge of waste-water from the hydrazine blending operation to the RMA sanitary sewage treatment

plant. The carbon filtration treatment system used at the sewage treatment plant may not remove all remaining contaminants. Therefore, pilot tests should be conducted on the effluent from the sewage treatment plant after treatment by both of the selected alternatives to determine what contaminants would be discharged to First Creek.

8. An investigation must be conducted to establish that the sewage treatment plant can manage 1,000 gallons of excess wastewater.

9. The dry removal technique for asbestos proposed in the Decision Document is an unacceptable removal methodology. Prior to implementing removal of asbestos from the HBSF, Army personnel must demonstrate the dry removal technique to personnel from the Colorado Department of Health Air Pollution Control Division.

10. On page 26 of the Decision Document it states that "uncontaminated material suitable for reuse and therefore not subject to hazardous waste regulation (40 C.F.R. Sec. 261.3(e)(ii)) will be removed prior to demolition." There is no 40 C.F.R. Sec. 261.3(e)(ii). Furthermore, 40 C.F.R. 261.2 (f) states that if a material is to be reused as a substitute for a commercial product there must be documentation of a known market or disposition for the material. Therefore, the Decision Document must include documentation of how the Army made or proposes to make the

determination that the materials are uncontaminated and suitable for reuse. Similarly, the Decision Document must include documentation of where the uncontaminated materials will be reused.

11. The Decision Document must include a description of the proposed air monitoring program which will be implemented when treatment commences to determine levels of effluent discharge from the mobile units.

RESPONSES TO COMMENTS SUBMITTED BY THE STATE OF COLORADO ON THE PROPOSED DECISION DOCUMENT FOR THE HYDRAZINE BLENDING AND STORAGE FACILITY INTERIM RESPONSE ACTION, JULY 1988

1. Comment: The HBSF is a RCRA regulated facility and must be closed in accordance with the Colorado Hazardous Waste Management Act (CHWMA), specifically 6 CCR 1007-3, Subpart G, Sections 265.110 et seq. and any new treatment, storage or disposal facility must be permitted under the CHWMA by the Colorado Department of Health.

Response: The comprehensive cleanup program at Rocky Mountain Arsenal, including the HBSF IRA, is being conducted under CERCLA. Substantive requirements of the CHWMA are analyzed during the development of ARARs for the IRA. Pursuant to CERCLA, no permits are required for the conduct of this IRA.

2. Comment: The Decision Document selects two treatment technologies, hydrogen peroxide/UV and ozone/UV, for the management of hazardous waste at the HBSF. However, neither of these two technologies has been demonstrated to be effective in the field. Please explain the rationale for choosing hydrogen peroxide/UV alternative over proven field tested methods such as incineration, given that the treatment efficiency of hydrogen peroxide/UV indicates that the destruction of hydrazine compounds and intermediates is only "highly probable". Therefore, the rationale for selecting the hydrogen peroxide/UV alternative requires further explanation.

Response: Ozone/UV technology has been field demonstrated (see Final Report Hydrazine Blending and Storage Facility Waste Water Treatment and Decommissioning Assessment, June 1988, pp. 1-34 & 2-9). The "highly probable" rating cited was assigned in the initial alternatives screening. After laboratory testing and a detailed alternatives analysis, hydrogen peroxide/UV was assigned a "high" rating for technical feasibility (Table 5, Summary of Final Waste Water Treatment Alternative, p.23). This rating is the same as that assigned to Ozone/UV and incineration. Hydrogen peroxide/UV is considered equal to the Ozone/UV alternative since both processes introduce the radical (OH) into the waste water, but by different media (gas for ozone, liquid for peroxide). As the hydroxal radical is the oxidizing species in the reaction, the two technologies should be identical in equal dosages.

3. Comment: The detection limit for NDMA is too high. A lower detection level is necessary for this compound based upon its toxicity. The proposed action levels are based on the length of treatment, disguised as detection levels, rather than health based criteria. The standards for health based action levels are two to three orders of magnitude lower than the detection limits. The lowest certifiable detection level must be identified and used during treatment.

Response: The Army is also concerned that the current certified detection limit of 200 parts per trillion (ppt) is above the AWQC of 1.4 ppt. Measurement at these levels is extremely difficult. However, the Army is making every effort to obtain information concerning further advances in this area and identify new methods that can be applied which may increase the ability to detect NDMA at lower levels. The Army appreciates the information provided by the state concerning this problem. The Army will test recent methods to determine if a lower detection limit can be certified with the actual equipment used in this IRA on the actual wastewater. The proposed action levels were based on detection limits, since results could not be identified at any lower levels. The results of laboratory testing should not be confused with pilot or start-up testing. The laboratory testing was only intended to demonstrate that a particular level could be obtained. UV dosage levels and exposure area per liter of wastewater treated will be approximately 100 times that of the laboratory test apparatus. Destruction of the compounds of concern by this equipment is expected to be more rapid than with the laboratory equipment. Start-up testing will be used to develop actual detection capability and treatment times.

4. Comment: The State remains concerned with the methodology used in the analysis of hydrazine and its compounds. The State has received two different responses from Mr. Stutz, Laboratory Manager for USATHAMA, regarding which analytical method is certified by them, colormetric or gas chromotography. The State requests clarification as to which method is certified and proposed to be used for soils and groundwater.

Response: The colormetric method was certified for both soil and groundwater, but is nonspecific for hydrazine compounds. Gas chromotography was therefore certified for groundwater only. NDMA is analyzed using EPA method 607.

5. Comment: The text states that the ozone/UV alternative would require approximately six months to complete treatment. At the August 11, 1988 public meeting Army representatives indicated that the duration of the project would be approximately 20 months. However, test results presented in the Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, June 1988, p. 2-37, indicate that greater than two and one-half years would be required to meet the unacceptably high action levels proposed by the Army. These disparities in length of treatment time must be clarified. Furthermore, the summary of the interim action should include a timetable which projects the starting and concluding dates.

Response: The Army is committed to attaining the schedule presented at the public meeting. The approximate rate of treatment needed to attain that schedule is 10,000 - 12,000 gallons per week. The number and sizes of treatment vessels to be used in this IRA will be designed to attain this treatment rate. The Army is not aware of how the two and one-half year estimate was arrived at by the State, but reiterates that laboratory testing can not be directly related to actual operations when determining treatment periods. Due to the continuing advances in this specific treatment process, which the Army intends to take full advantage of, a particular schedule can not be established until after start-up testing and will be contained in the Implementation Document. The Decision Document will identify the milestones to be contained in the Implementation Document.

6. Comment: As stated in the Final Report Hydrazine Blending and Storage Facility Wastewater Treatment and Decommissioning Assessment, June 1988, p. 2-29, "unknown constituents in the wastewater could interfere with the treatment." A complete analysis must be performed on the wastewater, including identification of all non-target compounds, to ensure that the proposed treatment will destroy all contaminants prior to being discharged to the sewer. In addition, pilot tests performed pursuant to the above cited report indicated that other compounds present in the water, such as methylene chloride and acetone, were not effectively destroyed by ozone/UV treatment. The State is concerned that the Army has selected an alternative treatment methodology that does not treat all contaminants in the wastewater.

Response: The comment cited on p. 2-29 discussed the need to conduct treatability testing of the ozone/UV and hydrogen peroxide/UV technologies. The results of these tests indicated that no unknown constituents were interfering with wastewater treatment. A complete analysis of expected compounds was performed during the assessment and treatability studies. The wastewater was analyzed for the three hydrazine fuels, NDMA and 12 chlorinated compounds. Concerning the destruction of methylene chloride and acetone, an analysis of initial and final wastewater from the fourth treatability test was conducted. Methylene chloride was destroyed at a 98 percent rate. Acetone appeared in the treated wastewater as either an oxidation product or as a one time artifact of the treatability test. The level of acetone in the treated wastewater was an order of magnitude below water quality levels. The Army is committed to providing treatment of this wastewater that will be protective of human health and the environment and will demonstrate destruction capabilities during start-up testing.

7. Comment: The Decision Document proposes to discharge incompletely treated wastewater to the RMA sanitary sewer. The Army's current NPDES permit does not allow the discharge of wastewater from the HBSF to the sanitary sewer. The carbon filtration system used at the sewage treatment plant may not remove all the remaining contaminants. Therefore, pilot tests should be conducted on the effluent from the sewage treatment plant after treatment by both the selected alternatives to determine what contaminants would be discharged to First Creek.

Response: As noted in the response to EPA comments on this document, the Army has determined that the AWQC for NDMA is relevant and appropriate to apply to this IRA. The Army is committed to wastewater treatment that will attain this standard to the maximum extent practicable. The planned treatment of the wastewater is not dependent upon treatment which may occur at the sewage treatment plant. The testing of influent or effluent at the sewage treatment plant would be meaningless because the levels of hydrazine related contaminants discharged to the sewer would be below detection limits and this treated water would be diluted at approximately a 10 to 1 ratio by other liquid influents.

8. Comment: An investigation must be conducted to establish that the sewage treatment plant can manage 1,000 gallons of excess wastewater.

Response: As noted in the response to comment 5, the Army will select and size treatment systems to achieve a 10,000 - 12,000 gallon per week treatment rate. This rate corresponds to a continuous discharge to the sewage treatment plant of 0.99 to 1.19 gallons per minute (gpm). The maximum sewage treatment plant capacity is 30 gpm with average sewage inflow currently of 7 to 10 gpm. Based upon these facts, sewage treatment plant capacity is not considered to be a problem in implementing this IRA.

9. Comment: The dry removal technique for asbestos proposed in the Decision Document is an unacceptable removal methodology. Prior to implementing removal of asbestos from the HBSF, Army personnel must demonstrate the dry removal technique to personnel from the Colorado Department of Health Air Pollution Control Division.

Response: The dry removal technique for asbestos removal was proposed because of the likely contamination of the asbestos with hydrazine and related hazardous substances. The addition of water to a hazardous substance prior to landfill disposal is generally prohibited and not considered an environmentally sound approach. The Army intends to demonstrate that the dry removal technique is equivalent to wet removal. Demonstration will be performed for EPA, the State and any other interested organization identified in the proposed Consent Decree.

10. Comment: Page 26 of the Decision Document states that "uncontaminated material suitable for reuse and therefore not subject to hazardous waste regulation (40 C.F.R. Sec. 261.3(e)(ii) will be removed prior to demolition." There is no 40 C.F.R. Sec. 261.3(e)(ii). Furthermore, 40 C.F.R. 261.2(f) states that if material is to be reused as a substitute for a commercial product there must be documentation of a known market or disposition for the material. Therefore the Decision Document must include documentation of how the Army made or proposes to make the determination that the materials are uncontaminated and suitable for reuse. Similarly, the Decision Document must include demonstration of where the uncontaminated materials will be reused.

Response: The correct citation is 40 C.F.R. Sec. 261.2(e)(1)(ii). The Army does not agree with the State's interpretation of 40 C.F.R. Sec. 261.2(f) provided in the comment and does not believe that the actions proposed in the comment are required in the Decision document.

11. Comment: The Decision Document must include a description of the proposed air monitoring program which will be implemented when the treatment commences to determine levels of effluent discharge from the mobile units.

Respose: The only appreciable effluent from ozone/UV or hydrogen peroxide/UV is liquid, the treated wastewater. The treatment reactions will produce small amounts of nitrogen (N2) and may release small amounts of unreacted oxygen (02) in the case of ozone/UV. The factual context of the IRA treatment system does not justify the provision of air monitoring for this system.

Shell Oil Company

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August 22, 1988

Office of the Program Manager for Rocky Mountain Arsenal
ATTN: AMXRM-PM: Mr. Donald Campbell
Rocky Mountain Arsenal, Building 111
Commerce City, CO 80022-2180

Dear Mr. Campbell:

Enclosed herewith are Shell Oil's comments on the Proposed Decision Document for the Interim Response Action at the Rocky Mountain Arsenal Hydrazine Blending and Storage Facility, July 1988.

Based on Army statements at the July 7, 1988 RMA Committee meeting, it appears that this version of the Hydrazine IRA Decision Document should be titled Draft Final rather than Proposed. It is Shell's understanding that the Proposed version of review documents is issued for the 20-day Dispute Resolution review period, following review and comment on the Draft Final version.

Sincerely yours,

R. D. Lundahl
Manager Technical
Denver Site Project

RDL:pk

Enclosure

cc: (w/enclosure)
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Shell Oil Comments on: Proposed Decision Document for the Interim Response Action at the Rocky Mountain Arsenal Hydrazine Blending and Storage Facility.

July 1988

1. Page 9, first sentence

   It should be noted that a modified Consent Decree was filed June 7, 1988.

2. Page 9, second sentence

   The words "to share costs of the cleanup" should be replaced with "to share certain costs of the cleanup." Not shared are Army-Only Response Costs (such as those for the HBSF IRA) and Shell-Only Response Costs.

3. Page 10, third bullet

   Change the "and" after "mobility" to "or".

4. Page 10, fourth bullet

   Replace "Minimize cost" with "Be cost-effective."

5. Page 13, Table 3

   Under Chlorination, Description, change to: "Chlorine, an oxidizing agent, supports chemical oxidation of a substance."

6. Page 23, Table 5

   Change the heading of the fourth column from "Human Health and Environmental Impacts" to "Protection of Human Health and Environment".

7. Page 25

Add a reference to the filing of a modified Consent Decree on June 7, 1988.

8. Page 26, item 4.

Insert "possible" in front of "presence of hydrazine or NDMA".

9. Page 31, paragraph 4.

The document issued for public comment is the "Draft Final" version, not the "Proposed" version.

Change "shall then issue" and "shall be subject" in the first sentence to "then issued" and "is subject", respectively.

10. Page 31, paragraphs 4 and 5.

The document issued for 20-day review is the "Proposed" version, not the "Draft Final" version.

11. Page 32, 8.1 Attainment of ARARs.

Instead of referring to an ARAR simply as an "applicable or relevant and appropriate Federal or State standard", the document should include a definition for ARAR that follows section 121(d)(2) of CERCLA more closely, such as the following: "a standard, requirement, criterion, or limitation under any Federal environmental law (or a more stringent promulgated standard, requirement, criterion, or limitation under a State environmental or facility siting law) that is legally applicable to the hazardous substance or pollutant or contaminant concerned or is relevant and appropriate under the circumstances of the release or threatened release."

12. Page 32, 8.2 Identification and Selection of ARARs

This paragraph should be deleted, because it is irrelevant to the process agreed upon for identification and selection of ARARs under paragraph 9.7 of the proposed Consent Decree.

13. Page 33, second paragraph.

Shell has previously opposed setting clean-up standards at a lifetime risk level of 10^{-6}. See May 12, 1988 letter from E. J. McGrath to Donald L. Campbell.

14. Page 33, third paragraph.

In the second sentence, delete "Because the health based level (1.4 ppt) is far below detection technology limits (200 ppt), - - -". This portion of this sentence is a non-sequitur.

The text should state that in this instance action levels are based on detection limits in lieu of a risk assessment.

15. Page 33, footnote 3.

Reference(s) should be cited to support the statement that treatment of waste water to NDMA detection limits assures that the other substances (hydrazine, MMH, UDMH and chlorinated compounds) will be reduced to below detection limits.

The last sentence of this footnote should be deleted for the reason stated under comment 13, above.

16. Page 41, 8.3.3.6 Regulations Protective to Workers

Shell supports the application of worker protection standards to this IRA. These standards, however, are not ARARs and should be deleted from the ARAR analysis.

17. Page 44

Change "will be consistent with any final remediation for the HBSF." to "is anticipated to be consistent with final response actions to the maximum extent practicable."

18. Page 40, paragraph (ii).

The Colorado Ambient Air Quality Standards, Air Quality Regulation A, "Diesel-Power Vehicle Emission Standards for Visible Pollutants, " is only an ARAR to the extent that motor vehicles may haul soils off-site. The regulation, by its terms, applies only "to motor vehicles intended, designed and manufactured primarily for use in carrying passengers or cargo on roads, streets and highways." See paragraph D of the regulation.

RESPONSES TO COMMENTS SUBMITTED BY SHELL OIL COMPANY ON THE PROPOSED DECISION DOCUMENT CONCERNING THE HYDRAZINE BLENDING AND STORAGE FACILITY INTERIM RESPONSE ACTION, JULY 1988

1. Comment: Page 9, first sentence should note that a modified Consent Decree was filed on June 7, 1988.

Response: The text has been revised.

2. Comment: Page 9, second sentence should replace "to share the costs of the cleanup" with "to share certain costs of the cleanup."

Response: The text has been revised.

3. Comment: Page 10, third bullet, "and" after "mobility" should be changed to "or."

Response: The text has been revised.

4. Comment: Page 10, fourth bullet, "minimize cost" should be replaced with "be cost-effective."

Response: The text has been revised.

5. Comment: Page 13, Table 3, description under chlorination should be changed to "Chlorine, an oxidizing agent, supports chemical oxidation of a substance."

Response: The text has been revised.

6. Comment: Page 23, Table 5, the heading of the fourth column should be changed from "Human Health and Environmental Impacts" to "Protection of Human Health and Environment."

Response: The text has been revised.

7. Comment: Page 25, a reference should be added to the filing of a modified Consent Decree on June 7, 1988.

Response: The text has been revised.

8. Comment: Page 26, item 4, "possible" should be inserted in front of "presence of hydrazine or NDMA."

Response: The text has been revised.

9. Comment: Page 31, paragraph 4, the document issued for public comment is the Draft Final version not the Proposed version. "Shall then issue" and "shall be subject" in the first sentence should be changed to "then issued" and "is subject", respectively.

Response: The comment is correct concerning the tense appropriate in the description noted but incorrect concerning the designation of documents.

10. Comment: Page 31, paragraphs 4 and 5, should state that the document issued for the 20 day review is the "Proposed" not the "Draft Final" version.

Response: The comment is incorrect. See paragraphs 9.9 and 9.10 of the modified Consent Decree.

11. Comment: Page 32, Section 8.1, should include a definition for ARAR that follows CERCLA Sec. 121(d)(2) instead of the brief one which appears.

Response: The suggested approach is a better practice and will be utilized.

12. Comment: Page 32, Section 8.2 should be deleted because it is irrelevant to the process agreed upon for identification and selection of ARARs under paragraph 9.7 of the proposed Consent Decree.

Response: The Army does not agree that this section should be deleted. It is included to reflect the history of the document's development.

13. Comment: Page 33, second paragraph. Shell has previously opposed setting clean-up standards at a lifetime risk level of 10 to the minus 6.

Response: Comment noted.

14. Comment: Page 33, third paragraph, second sentence should delete "Because the health based level (1.4 ppt) is far below detection technology limits (200 ppt),..." because it is a non-sequitur. The text should state that in this instance action levels are based upon detection limits in lieu of a risk assessment.

Response: This section has been revised. Shell should review the approach now reflected in the document.

15. Comment: Page 33, footnote 3, references should be cited to support the statement that treatment of wastewater to NDMA detection limits assures that other compounds will be reduced to below detection limits. The last sentence of the footnote should be deleted.

Response: The text has been revised.

16. Comment: Page 41, Section 8.3.3.6 should be deleted from the ARAR analysis since these worker protection standards are not ARARs.

Response: The Army believes it is appropriate for this section to remain in the document.

17. Comment: Page 44, "will be consistent with any final remediation for the HBSF." should be changed to "is anticipated to be consistent with the final response actions to the maximum extent practicable."

Response: The text has been revised.

18. Comment: Page 40, paragraph (ii), the Colorado Ambient Air Quality Standards, Air Quality Regulation A, "Diesel-Powered Vehicle Emission Standards for Visible Pollutants" is only an ARAR to the extent that motor vehicles may haul soils off-site.

Response: The comment is correct.